MACHINE TOOL BLUE BOOK

DECEMBER 1942

"Performance has established leadership for HARDINGE High Speed Precision Machines"

HARDINGE BROTHERS, INC.
ELMIRA, N. Y.

MARVEL SAWS

"A GREAT IMPROVEMENT OVER PREVIOUS CUTTING METHODS" SAYS BELL & GOSSET CO

Among the first machine tools installed in the new plant Bell & Gosse Co., manufacturers of hot water heating specialties, have just com pleted for the manufacture of "B & G" Hot Water Heating Specialties was a MARVEL No. 8 Metal-cutting Band Saw - - the most universa metal cutting saw built. They report that this saw which they use t cut-off, cut-out and trim 3½", 5", 7" and 10" seamless steel pipe, sheets, plates and castings, " handles the work easily and is a great improvement over the previous method of cutting with a torch."

ARMSTRONG - BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U.S.A.

Eastern Sales Office: 225 Lafayette St., New York

SYMBOL OF **HOBART BROTHERS CO.'S**

"Will to Win"

We want YOU to have the advantages of Hobart Simplified Arc Welders on YOUR production, and are exerting every effort to build more and more of them. A letter or card today will bring you valuable information on how welding can help speed your production--how you can train your men at the Hobart Welding School.

HOBART BROTHERS CO., BOX TB 122,
TROY, OHIO

RIVETT

918 HAND SCREW MACHINE

For Bar or Individually Chucked Work Requiring up to Eight Successive Operations

The Rivett No. 918 Hand Screw Machine incorporates pre-[illegible] balanced design and operating features to make it an[illegible] on small duplicate parts. Work requiring [illegible] successive operations can be finish-machined at [illegible] spindle may be [illegible] drawn [illegible] chuck. In combination with six [illegible] slide may be [illegible] for straight or taper [illegible] cut-off. [illegible] chasing bar for internal or external threading, or compound slide rest with turret tool post. Steel cabinet mounting has rimmed top and pump for cutting oil. Bench mounting is optional.

ARMY NAVY

Straight and Taper Turning Slides

Straight Turning Slide and Fixed Block

Cutting-Off and Forming Blocks

SPECIFICATIONS

Swing over bed, dia.	8"
Distance between spindle nose and face of turret	
With draw-in collet	14¼"
With push-out collet	13½"
Collet capacity	
Draw-in type, max. dia.	1"
Push-out type, max. dia.	1"
Step chuck capacity, max. dia.	6"
Jaw chuck capacity, max. dia.	6"
Spindle capacity, max. dia.	1¼"
Travel of turret slide, max.	4½"
Number of tool holes in turret	8
Dia. and depth of tool holes	⅝" x 1"
Swing over double tool slide	4½"
Cross travel of double tool slide	3"
Travel of straight turning slide	9¼"
Travel of taper turning slide	3¼"
Spindle speeds, eight forward and reverse	
Low range	150 to 2500 r.p.m.
High range	225 to 3750 r.p.m.
Weight of bench screw machine, mounting and drive, net	900 lbs.

RIVETT LATHE & GRINDER INC

BRIGHTON, BOSTON, MASS.

PIONEERS IN BENCH LATHE DEVELOPMENT

HARDINGE

Style "B"

ster Feed Fingers and Replaceable Pads

ave Material

ge-over to a new size or to renew the same size involves inexpensive
instead of expensive solid feed fingers.

s saving is more important than ever before as the economy not only
ney for you, but also conserves steel which is of vital importance.

er advantages of using HARDINGE Style "B" Master Feed Fingers
or steel, bronze or nickel cast iron pads will be immediately appre-
en you put them into use.

Learn all the advantages by asking for this illustrated bulletin containing complete information. Available to purchasing agents, superintendents, foremen, engineers, set-up men and operators in organizations which have a screw machine department.

ARDINGE BROTHERS, Inc., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

ARMSTRONG

This ARMSTRONG Boring Tool does the work of 9 complete sets of forged Boring and Internal Threading Tools

ARMSTRONG 3-Bar Boring Tools come with 3 bars, each of which hold cutters at 3 different angles (90°, 45°, 30°), all of which can be set at any desired clearance. Not only is it the most versatile boring tool but it's the most efficient boring tool available. The bars are of special steel, heat treated and are exceptionally stiff. Each has three interchangeable End Caps for holding the cutters at angles of 90°, 45°, or 30°. They take standard shaped cutters quickly ground from stock shapes of high speed steel. The patented end caps hold the cutter rigidly under a tool steel "automatic set screw"—cannot loosen while cutting, yet instantly release the cutter for removal. There are no projecting screws to scrape or scar the work.

The holder slips directly into the T-slot of the compound rest in place of the tool post and a slight turn of the large lock nut locks or releases both bar and holder. Bars can be changed or clearance adjusted instantly in this manner, permiting the use of the stiffest possible bar at all times.

For every operation on lathes, planers, slotters and shapers, the Armstrong System provides other ARMSTRONG TOOL HOLDERS similarly efficient, that take standard shape high speed steel cutters and "Save: All forging, 70% Grinding and 90% High Speed Steel." Each is the product of a half century of specialization in cutting tool design and the inherent strength possible only with modern steels and modern manufacturing methods.

Use ARMSTRONG TOOL HOLDERS on all operations and cut cutting costs, save tooling time, and increase output. Write for Catalog C-39.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

308 N. FRANCISCO AVE.
CHICAGO, U. S. A.

Eastern Warehouse and Sales
199 Lafayette St., New York

Buy ARMSTRONG Tools from your Industrial Dealer

Machine Tool Blue Book

Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

34,000 This Issue *Published Monthly* *Volume 38, No. 12*

DECEMBER 1942

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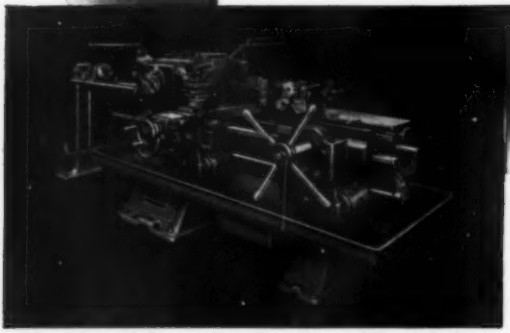
Mr. Howe was ahead of

WHO invented the turret lathe? This still seems to be an open question. Prior to 1850 its principles were understood but had been used only in occasional special machines built by manufacturers for their own shops. Frederick W. Howe brought the turret lathe idea to Vermont in 1847. There Howe, Lawrence, Stone and Alvord built the first turret lathe for general sale. This pioneer model was built in the shop from which Jones & Lamson Machine Company is a direct successor.



No. 3 Jones & Lamson Ram Type Universal Turret Lathe with standard bar equipment.

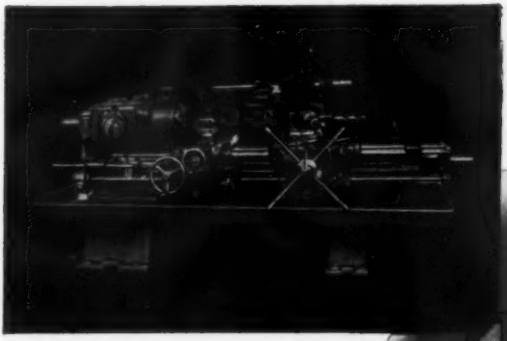
JONES

his time - and so are you.!

REDERICK W. HOWE was ahead of his , and so are you, when your plant is pped with modern Jones & Lamson Turret es.

odern Jones & Lamson Turret Lathes are d of the times in many ways. Into these machines have been built ample reserves peed, rigidity and useful power to enable you to take full advantage of every improvement in hard alloy cutting tools — available today *or liable to become available in the immediate future.*

Thus Jones & Lamson Turret Lathes can help you meet the urgent demands of immediate wartime production and still be available to help you in the hard years that lie ahead.



Jones & Lam- Saddle Type versal Turret he with stand- chucking equipment.

& LAMSON
MACHINE COMPANY
Springfield, Vermont, U. S. A.

PROFIT-PRODUCING
MACHINE TOOLS

MANUFACTURERS OF: RAM & SADDLE TYPE UNIVERSAL TURRET LATHES . . . FAY AUTOMATIC LATHES . . . AUTOMATIC THREAD GRINDING MACHINES . . . COMPARATORS . . . AUTOMATIC OPENING THREADING DIES AND CHASERS

Metal Chip

● ***Chip Formation, Friction, and Finish, Publication No. M-989.***

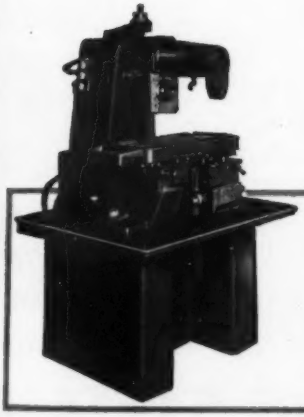
THE CINCINNATI MILLING MACHINE CO.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . CUTTER SHARPE

...Tell Their Own Story

● To the well-informed, the characteristics of metal chips reveal what happens during the cutting process; why a particular finish was obtained; the reasons for greater or lesser power consumption. All these considerations—the tie-in between theory and practice—are covered in the booklet illustrated at the left, "Chip Formation, Friction and Finish." This booklet, prepared by the Research Department of The Cincinnati Milling Machine Co., is available free of charge.

Research activity in metal cutting has developed many beneficial features of CINCINNATI Milling, Grinding, Broaching, Lapping and Cutter Sharpening Machines. The O-8 Plain Automatic Millers, for example, have automatic table and spindle carrier feed cycles; cycle selectors for quick change-over from one job to another; 400" per minute table rapid traverse; accurate feed trip. These and many other features make the O-8's tops in the manufacture of instruments, small arms, small machine gun parts, and similar equipment.



CINCINNATI No. O-8 Plain Automatic Milling Machine . . . built in two ways...with or without automatic rise and fall spindle carrier, Catalog No. M-964

CINCINNATI GRINDERS INCORPORATED CINCINNATI, OHIO, U.S.A.

...INES ... CENTERTYPE GRINDING MACHINES ... CENTERLESS GRINDING MACHINES ... CENTERLESS LAPPING MACHINES

New Models! New De

In ERICKSON *Precisi*

THERE IS NOW AN IMPROVED ACCUR ERICKSON CHUCK *for* EVERY TYPE

Two new models have been added to the well known line of E greater accuracy and precision for general work and the "C Lathes, Automatics and Screw Machines.

These three lines are available in a complete range of sizes and equipment. The new, complete, improved line is the result of Erickson Engineers collaborating with prominent users thr

Bulletin "D" gives complete information on the New Erickson Chucks. Send for your copy today.

Model 201 use Drill Press,

● *SEND FOR THIS BULLETIN*

8-POINT COLLET GRIP

The Erickson Collet - open slotted at both ends - grips the tool shank *(at 8 points instead of three)* permitting heavier feeds without vibration or loosening. Collet is capable of collapsing as much as 1/32" while maintaining its grip and accuracy.

Vertical Milling op with Model 101 C

THE ERICKSON STEEL C

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New Efficiency

LET CHUCKS

DEL OF THE
DUCTION WORK

These are the "01" of
designed for Turret

them for all types of
and improvement by

NEW MOEDL
"01"

Special Model 202 on Hand Drill

Models 102 and 402 on
Automatic Screw Machine.

Model 402 Chuck in use on
Automatic Screw Machine.

Main and Auxiliary turrets equipped with Erickson Chucks.

Horizontal Miller with
102 Chuck

Model 102 Chucks for drilling
and tapping operations on
Turret Lathe.

Tool Post Grinder equipped
with Model 301

Wherever metal-workin
is in full swing,

there
you'll
find—

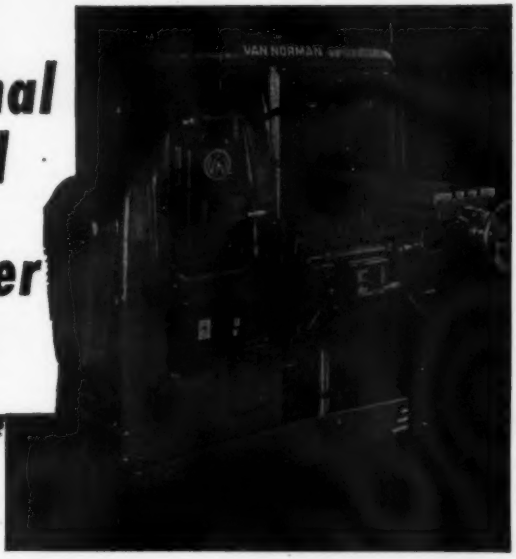
THE NATIONAL STANDARD
FOR **WAR PRODUCTION**

IF IT'S A JACOBS—IT HOLDS!

THE JACOBS MANUFACTURING COMPANY, HARTFORD, CONN.

VAN NORMAN MILLERS

HAVE Directional Control OF All Power Feeds



It is easy for the apprentice to learn and the skilled operator to remember that the table, knee and saddle of any Van Norman Miller travels in the same direction that the control levers are moved.

If the operator is standing in front or rear of the machine and wishes to move the table to the right, he moves the table control lever to the *right*. If he wants to raise the knee, he *lifts* the control lever for the knee. If he wants to lower the knee, he pushes this same lever *down*.

Add to these features the front and rear control of feed selection by a single lever, and front and rear control of 6-way power rapid traverse, and you will see why operators prefer Van Norman Millers.

VAN NORMAN

Machine Tool Company, Springfield, Massachusetts

HERE'S REAL HELP
for small parts production

On a floor space of only 29"x39", this new Vernon Horizontal Milling Machine provides fast, precision production at low cost. Table is 5½"x20". Longitudinal travel, 12". Transverse travel, 5½". Vertical travel, 9¼".

Vernon No. 0 Milling Machines embody important features found in larger units:—structural stability, superior craftsmanship, ample power (1 h.p.) and exceptionally smooth operation with maximum convenience to the operator. Fully enclosed drive gives variable spindle speeds within limits of 100 to 1000 r.p.m., or 150 to 1500 r.p.m.

Modern refinements include heat treated, ground alloy steel spindle mounted in Timken Tapered Roller Bearings; tapered gibs; automatic longitudinal feed (standard extra); etc. . . Many other standard extras available **from stock.**

Investigate! Distributors in all important industrial centers. Prompt orders insure early delivery. Send for complete specifications and folder.

VERNON No. 0 PLAIN HORIZONTAL PRECISION MILLING MACHINE WITH FULL HORSEPOWER MOTOR

MACHINERY MANUFACTURING COMPANY
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Vernon Line of **HORIZONTAL MILLS, VERTICAL MILLS and JIG BORERS, SHAPERS and GRINDERS**

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POWER TOOLS

TAPPING ATTACHMENTS
GROUND ROTARY FILES
FLEXIBLE SHAFT MACHINES

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

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"Drill Jig for gun mount cut in 1½ hours by the DoA Diameter 35", thickness 1" Due to accuracy required, plate could not be torch c The only other way to ha done this job would have be to slit it on a miller or par in a planer. Our DoAll solv the problem in one-quar the time."

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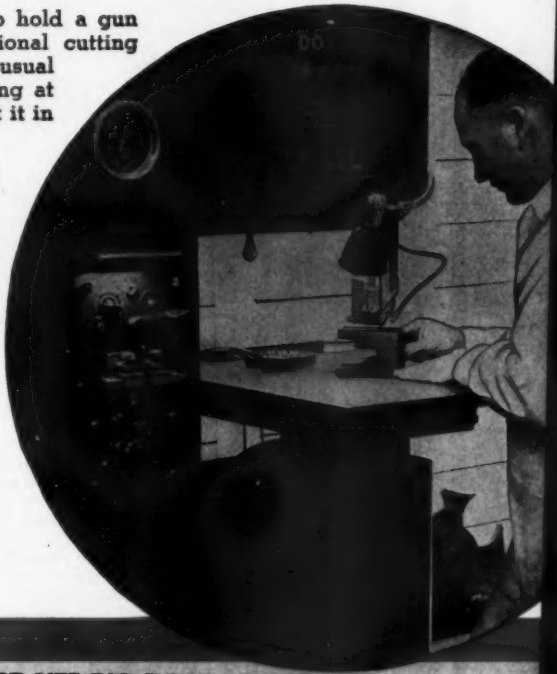
The World's Greatest Machine Tool Valu

- ★ Slices contours through thick sections.
- ★ Fastest precision method of internal and external cutting of any metal or alloy.
- ★ Cuts so clean, further machining is unnecessary.
- ★ Relieves miller, shaper and lathe of hundreds of overload jobs.
- ★ Eliminates bottlenecks on regular production lines.
- ★ Avoids shut downs of important machines by actually making new re placement parts.
- ★ Makes special tools with out dies or molds.
- ★ Saves hundreds of ma hours—tons of metal.

THE TIME STRETCHER

MAKES 4 MAN HOURS OUT OF 1

Special Jig Clamp used to hold a gun ght casting. A 3-dimensional cutting b 3¼" x 3¼" x 6". The usual ay was to shape it, requiring at ast eight hours. DoAll cut it in hours."



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factory trained man will all with a DoAll and show ou how this wonder ma- hine will aid in getting our jobs out ahead of chedule.

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Associated with the DoAll Company, Desplaines, Ill., Manufacturers of Band Saws and Band Files for DoAll Contour Machines.

THE EXACT SIZE FOR EVERY DEPARTMENT

All Models with Motors

Under $3000 | Under $2500 | Under $2000 | Under $1500 | Under $1000

WOMEN WORKERS *get* Speed and Accuracy

Model G-4. Vertical position of same machine shown in photo at right

with **PORTER-CABLE** **WET-DRY BELT SURFACER**

Model G-8 Wet-Dry Belt Surfacer. Does many jobs formerly done on millers, planers, grinders—**ten times faster.**

Here's a battery of machines doing second-operation work in a screw machine department—and doing it fast! Save time on all sorts of close-limit jobs with the Porter-Cable Wet-Dry Belt Surfacer with machine tool exactness! It takes off burrs and centertits, removes scratches, squares ends, polishes flats —yet holds the close tolerances required for precision aircraft parts. Wet Belt prevents fill-up, keeps the work cool and easy to handle, stops discoloration, and it's the safest possible method for all grinding operations.

Send in today for your copy of our free new booklet . . . the first step towards big savings in time and money !

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PORTER-CABLE MACHINE CO.
300-12 Exchange St. Syracuse, N. Y.

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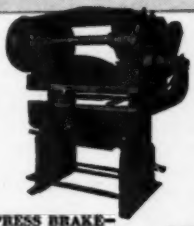
BOX AND PAN BRAKE—
Forms boxes or pans from one piece of metal. A straight brake as well as a box brake. Ideal for experimental shops.

HAND BRAKE—
Improved to meet modern needs. Efficient and dependable — sturdy and durable.

POWER BENDING BRAKE—
Indispensable wherever a volume of heavy plate work is done—forms a great variety of bends and shapes without dies.



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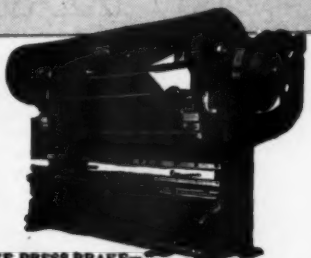
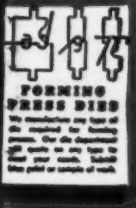
Compact, powerful money-saving production unit. Replaces cumbersome costly machines that are expensive to operate. Uses same dies as larger machines.



LARGE PRESS BRAKE—
The only press brake which turns out perfect work without shims and crowned dies. Patented non-deflecting bed equalizes pressure over the full bending length and overcomes major fault in solid bed press brakes.



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We manufacture any type of die required for forming process. Our die department will quote on any type to meet your needs. Submit blue print or sample of work.

42 Years Experience

building STEEL CONSTRUCTED sheet metal working machines are behind each CHICAGO BRAKE. They're built to give years of service.

ALL CHICAGO BRAKES are built of rolled steel welded sections which insure great strength, accuracy and long life. They are the most modern tools in design and workmanship to fit today's need for fast production sheet metal working machinery.

We Are The World's Largest Manufacturers Of Hand Bending, Power Bending And Power Press Brakes.

Aside from the CHICAGO line, we have built many special machines for intricate bending operations. Take advantage of our many years' experience by sending us any difficult bending problem you have.

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7440 LOOMIS BLVD., CHICAGO, ILL.

OVER 40,000 "CHICAGO" BRAKES in use by leading concerns the world over

IN WAR OR PEACE

The standard design of the Avey Type MA-6 Drilling Machine is easily adaptable to your War or Peace Production line. The advantages of a drilling machine that requires no elaborate, expensive changes is being appreciated by many leading industries. This Avey Drilling Machine, Type MA-6, is now being built in No. 2 size (capacity in cast iron ⅞ in.). No. 3 size (capacity in cast iron, 1¼ in.). One to six spindle units, either size. Six speed machine, two speed motor with three mechanical changes through gearing. Speed range is eight to one. Push button control. The above photograph is the MA-6 equipped with three spindles, the Aveymatic Feed, Hand Feed and Tapper.

THE AVEY DRILLING MACHINE CO.
Cincinnati, Ohio, U. S. A.

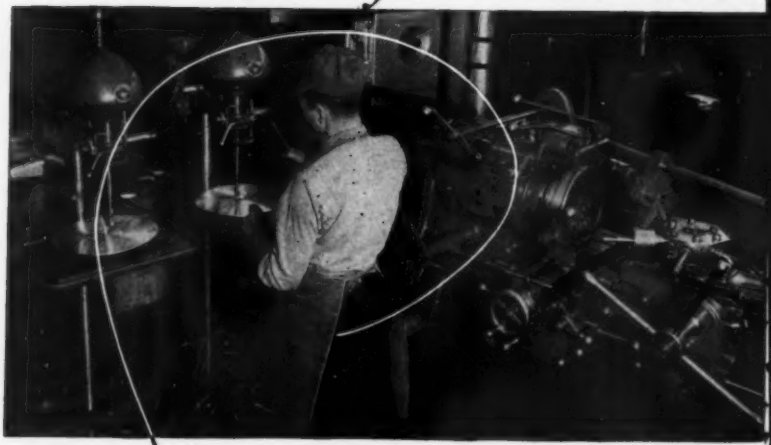
CINCINNATI · OHIO

Avey DRILLING MACHINES

No pause need refresh them
When time, space and manpower are precious, the tireless performance of fast, dependable multiple spindle automatics is appreciated.
Although machines may not tire, their operators often do. Simplicity and convenience of operation are important factors of a good machine.
The Departmental Design of a Conomatic contributes much to its efficiency and ease of operation. The loading area, work-head, overhead camshaft, and controls, are in orderly arranged units, conveniently accessible from either side of the machine.
These conveniences contribute to the effective results that good operators are getting from 4, 6 and 8 Spindle Conomatics.
Please your production gales by specifying CONES.
Cone Automatic Machine Co., Inc., Windsor, Vermont

where you want them

when you want them



The portability **and** ***flexibility*** **of Delta machines open many roads to increased production: Here illustrated are two 14-inch Delta Drill Presses set up alongside a screw machine. Operator performs two hand-feed operations on drill presses while waiting for power-feed on screw machine.**

Other examples: **When five drilling and tapping operations are required, a single spindle Delta Drill Press is moved up alongside a four-spindle drill press . . . to save toolmaker's walking and waiting time, individual Delta Drill Presses, Grinders and Band Saws are set up alongside each toolmaker's bench.**

DELTA DESIGN ALWAYS OFFERS THESE ADVANTAGES

- Low First Cost
- Low Maintenance Cost
- Economical Operation
- Reduced Labor Costs
- Greater Flexibility
- Portability

DELTA
MILWAUKEE

Send for FREE "Tooling Tips"

Shows how other manufacturers are taking advantage of DELTA-Milwaukee machines. Get in touch with your Delta Industrial Distributor or write to The Delta Manufacturing Company 604-N E. Vienna Ave., Milwaukee, Wis.

POWER SCRAPING *Speeds Up* PRODUCTION

Operator fatigue practically eliminated

The Anderson Power Scraper has a "natural hand control" . . . is as easy to use as a hand scraper. The left hand, as with a hand scraper, serves as a guide to the blade . . . the right hand controls the stroke. Pressure of the left hand controls the depth of the cut, but the forward cut requires no backbreaking labor. A slight forward pressure on the cylinder with the right hand starts the swift, smooth forward stroke which can be regulated from nothing to 3½ feet . . . 60 ft. per minute, reverse speed 90 ft. per minute. The operator can work at a steady rate without tiring as the ¼ h.p. motor does the heavy cutting. With this machine one man can do the work of several.

The Anderson Power Scraper, mounted on an elevating truck can be easily moved to any location. The machine may be plugged into any handy electric lamp socket and be ready for use. In the scraper housing directly across from the motor is a scraper blade grinder . . . a convenient, speedy means of resharpening scraper blades without leaving the machine.

ANDERSON

Power SCRAPERS

Write for Folder giving complete information

ANDERSON BROS. MFG. CO.

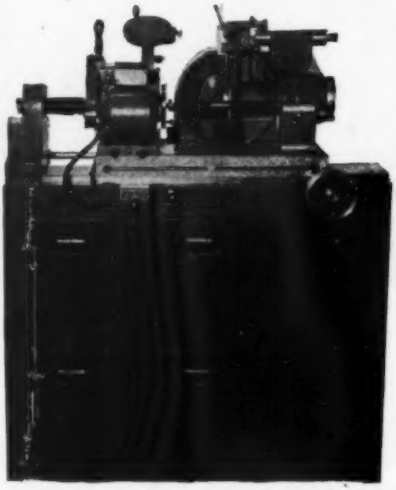
ROCKFORD, ILLINOIS, U. S. A.

GRINDALL

EXTERNAL GRINDER
INTERNAL GRINDER
TOOL GRINDER

THREAD GRINDER

MODEL B — 6"x12"



Announcing a new thread grinding machine, the culmination of seven years experience in building thread grinding equipment.

This machine is primarily a thread grinding machine for grinding external and internal threads but is also a very efficient machine for plain cylindrical grinding, plain internal grinding and general tool grinding.

Furthermore it can be used for grinding gages, such as snap gages, ring and plug gages.

SPECIFICATIONS

Capacity for external thread grinding, 6" dia. x 12" long.
Capacity for internal thread grinding, 6" dia. x 6" long.
Capacity for cylindrical grinding, 6" dia. x 12" long.
Capacity for internal plain grinding, 6" dia. x 6" long.
Maximum distance between centers, 12".
Swing over table, 10" dia.
Selective work head has 6 speeds and can be swung through 120° arc.
Separate lead screws for each pitch of thread.
Automatic compensation for wheel wear and trueing.
Coolant pump and oil tank in base.
Wheel dressers can be supplied for either US standard or Acme threads.
Both table and wheel head travel on ball bearing ways.
Weight approximately 2500 pounds.

GENERAL MACHINE TOOL CO.

SENECA FALLS
NEW YORK

"Victory depends on us."

Joseph C. Grew—Former American Ambassador to Tokyo

IN URGING EVERY AMERICAN to exert his maximum individual capacity in promoting the war effort, former Ambassador Grew emphasizes that victory or defeat does not rest alone in the hands of the fighting men thousands of miles away. Nor with the Generals and Admirals, or the Government in Washington.

BUT IT DOES DEPEND ON US—the millions who make up the American people. How, for example, are we responding to help relieve the present desperate shortage in scrap metals?

TODAY'S WAR PRODUCTION must have over 100,000 tons of scrap a day. That is more than 3,000,000 tons of iron and steel every month. The demand is enormous,—because every ton of new steel that goes into ships, trucks, tanks and guns is made up of one-half ton of scrap.

TO HELP SHORTEN THE WAR, to help save American lives, scrap is needed urgently. If you haven't already done so, organize your own scrap drive without delay. Your local Industrial Salvage Committee will help you plan a forceful program. Start collecting scrap of all kinds now—and keep this up until the war is won!

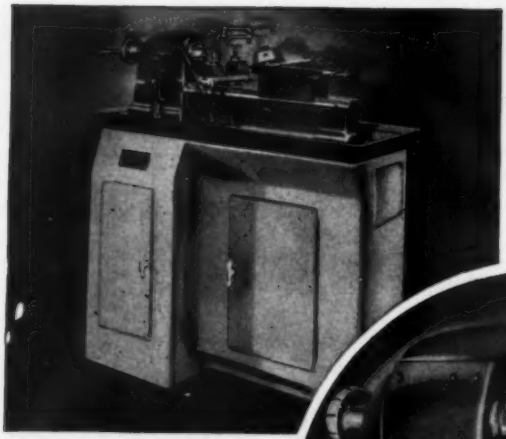
HELLER BROTHERS COMPANY

America's Oldest File Manufacturers—Good Tools Since 1836

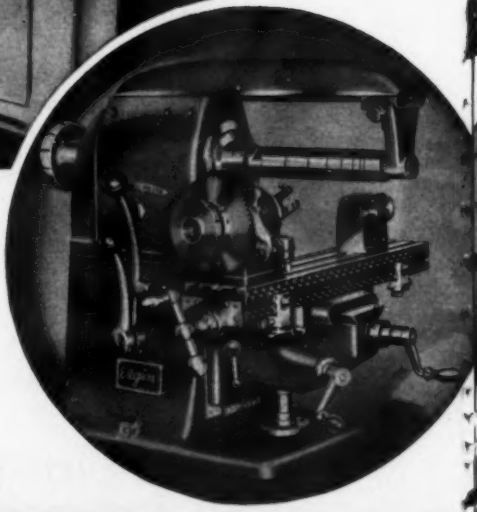
NEWARK, N. J. • NEWCOMERSTOWN, OHIO

Throw Your Scrap Into the FIGHT!

ELGIN PRECISIO



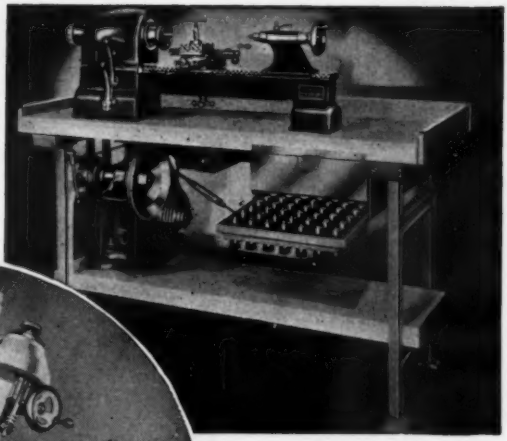
Precision Hand
Screw Machine



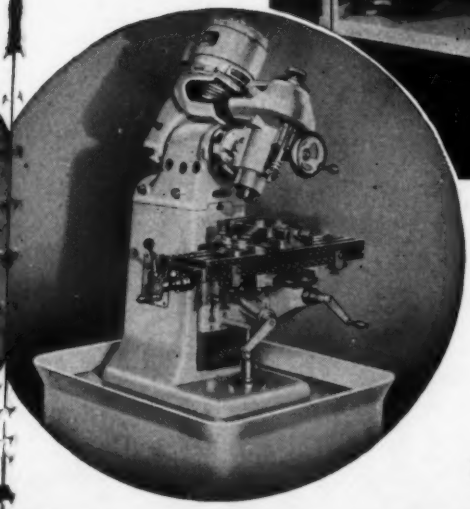
Bench
Milling Machine

ELGIN TOOL

MACHINE TOOLS



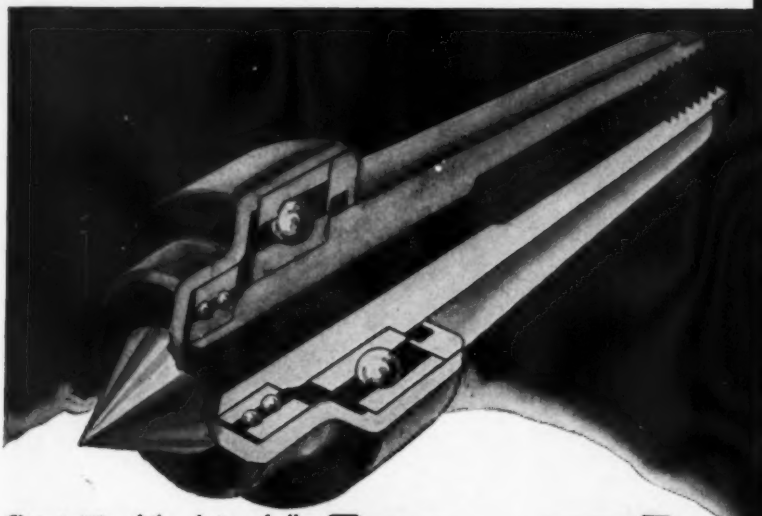
Precision Bench Lathe



Vertical Milling Machine

WORKS

1772 BERTEAU AVE.
AT RAVENSWOOD AVE.
CHICAGO, ILLINOIS



Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum . . . A properly engineered Live Center is one of the fundamentals of setting up a job and requires a specialists experience . . . standard shanks with Morse taper carried in stock . . . We will see that your job is set up with the right Live Center — Prompt deliveries on high priorities.

STURDIMATIC
TOOL COMPANY
5224 THIRD AVE. DETROIT, MICH.

put a Wells to work...

...and you'll see *Real* metal cutting action!

WHEN you want fast precision metal cutting in production, tool room or general maintenance work — put a Wells on the job. You'll have a saw that handles many shapes and types of metal with unusual smoothness and accuracy.

The Wells Series 80, above, is the latest model of the popular Wells No. 8. It has all the advantages that Wells have built into their products through years of leadership in band saw manufacture. It is a rugged, versatile unit, capable of cutting up to 8" rounds or 8" x 16" rectangles. You will find it one of the handiest tools in a plant. You can get one quickly too! Phone your distributor or write us.

Wells Has Established Leadership

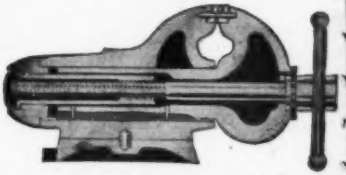
WELLS MANUFACTURING CORPORATION

METAL CUTTING BAND SAWS

707 COOLIDGE AVE. • THREE RIVERS, MICHIGAN

WILTON PRECISION VISE

REVOLUTIONARY IN THE FIELD OF VISES



Unrestricted
5 Year Guarantee

- INDESTRUCTIBLE
- ABSOLUTE PRECISION
- INTERCHANGEABLE JAWS
- GREATER HOLDING POWER
- NO SIDE TWIST OR WOBBLING
- PRECISELY GUIDED STEEL KEY (at base)

SIZES AND PRICES

WIDTH OF JAWS	MAXIMUM OPENING	APPROX. WEIGHT	PRICE WITHOUT SWIVEL	PRICE WITH SWIVEL
3"	4½"	19 lbs.	$10.50	$12.80
4"	5¼"	37 lbs.	16.40	18.60
4½"	5¼"	40 lbs.	19.10	21.30
4½" HEAVY DUTY	8½"	55 lbs.	23.00	27.50
5"	8½"	58 lbs.	28.00	33.60
6"	9½"	106 lbs.	48.50	62.00

Sizes 3'—4½' H.D. and 6' are built to conform to Federal Specifications GGG-V-436 as required by Army, Navy, etc.

Extra Jaws Available As Follows:	3"	4"	4½"	5"	6"
Smooth, Precisely Ground Steel, Hard or Soft	$1.90	2.85	3.30	4.40	5.50 pr.
Brass or Copper, Smooth	2.20	3.10	3.65	5.50	6.45 pr.

GOOD DELIVERY ON MOST SIZES

Send for the new Precision Production Tool Catalog No. 42

ACME TOOL COMPANY • 200 CHURCH ST. NEW YORK, N. Y.

OUT of the O'TOOLS

O ROUNDS—AIR VS. HIGH-CYCLE GRINDERS

HE WINNERS!

e 10-round BOUT of the O'TOOLS has ded in a draw! AIR took five rounds. GH-CYCLE took five. So they'll meet in a urn match.

The outcome of this Bout proves our ntentions:

That AIR tools are better suited for some op situations and HIGH-CYCLE tools are tter for others.

The way to be *sure* you get peak produc- n and lowest costs for *your* job is to have e Rotor Analyst give your specific prob- ns an unbiased engineering study with e solution based on the use of *either* AIR HIGH-CYCLE equipment.

Guess-work and prejudice are *out* when e O'TOOLS have it out!

And now, before the return match, the TOOLS are heading for a few skirmishes the Maintenance Front. Need help along ese lines? Call in the Rotor Analyst!

LET'S WHIP YOUR MAINTENANCE PROBLEMS!

This wall chart is part of our ammunition to help you make your tools last longer and give greater output. Charts on both AIR and HIGH-CYCLE tools are free on request.

ROTOR TOOL

HIGH CYCLE

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

1/4" Mall DRILL

MORE POWER • SPEED • SERVICE

A light-weight (3⅛ lb.), cool-running drill for continuous metal drilling under full load. Free speed 2850 r.p.m. full load speed 1850 r.p.m. Pistol grip and trigger switch simplifies use with either hand. Equipped with universal motor for 110-volt AC or DC, 25 to 60 cycles, also 220 volt AC or DC., 25 to 60 cycles, and efficient blower type ventilating fan. Easily and quickly serviced without dismantling drill.

MODEL 143T

GEARED HEAD 3 H.P. Other Models ¾ H.P. to 3 H.P.

Mall GEARED HEAD GRINDER

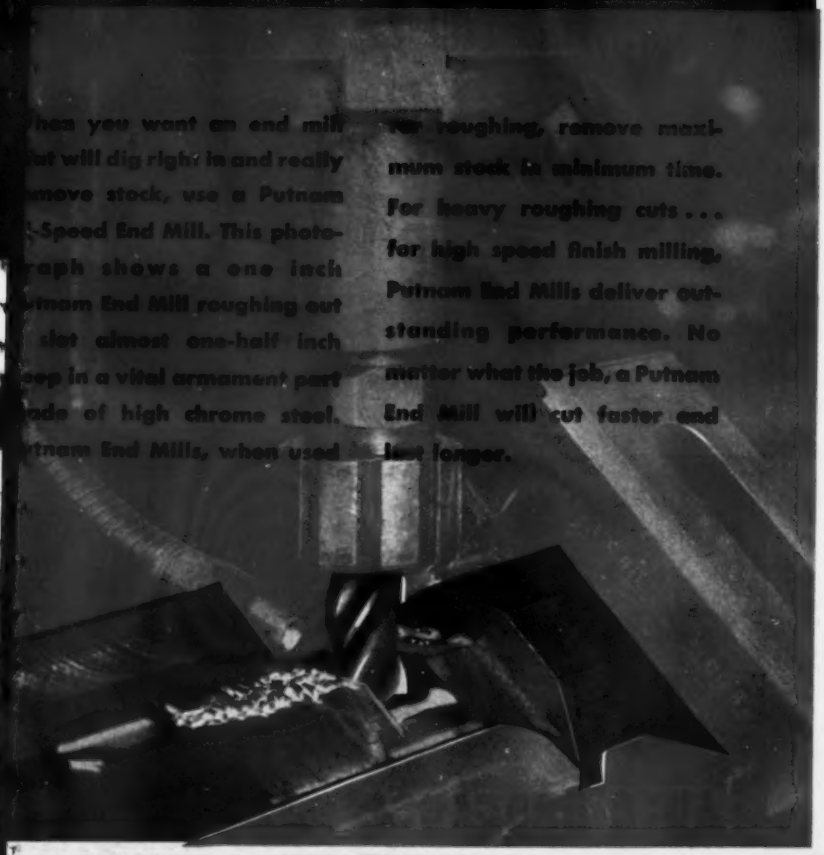
Independently powered by electric current. Light weight tools—no motor to carry. Easily rolled anywhere in the shop. Constant high speed dust and vaporproof, 3 H. P., 3 phase, 3450 r. p. m. 60 cycle motor geared to deliver 4500 r. p. m. Operates 6 quickly interchangeable tools for Grinding, Disc Sanding, Polishing, Buffing, Wire Brushing and Drilling that can be changed in a jiffy.

Available for Priority Work, Write TODAY for illustrated literature.

MALL TOOL COMPANY

7742 South Chicago Ave., Chicago, Ill.

TNAM END MILLS *for* ROUGHING CUTS *in* HIGH CHROME STEEL



hen you want an end mill
at will dig right in and really
move stock, use a Putnam
-Speed End Mill. This photo-
raph shows a one inch
tnam End Mill roughing out
slot almost one-half inch
eep in a vital armament part
ade of high chrome steel.
tnam End Mills, when used

for roughing, remove maxi-
mum stock in minimum time.
For heavy roughing cuts . . .
for high speed finish milling,
Putnam End Mills deliver out-
standing performance. No
matter what the job, a Putnam
End Mill will cut faster and
last longer.

PUTNAM TOOL COMPANY
2983 Charlevoix Avenue • Detroit, Michigan

Thompson

SPRING TOOL HOLDER

No cutter breakage damaged work

THE WILLARD THREADING AND FORMING TOOL SPRING HOLDER.

The Willard Spring Tool Holder, a Thompson product, is versatile—adaptable to a wide variety of uses and gives consistent, efficient and economical results. For threading, the "Willard" produces smooth, accurate threads close to a shoulder—can be used for coarse or fine threads without danger of chatter or tool marks. When used as a forming tool it assures faster, smoother machining free from cutter marks—ratchet design prevents cutter from turning under heavy loads. The Cutting-Off Tool Holder makes possible faster feed with a heavier cut.

THREAD TOOL GRINDING FIXTURE

Above illustration shows a 60 thread cutter being ground. By reversing fixture, the cutter is accurately ground to correct angle in a few minutes. square thread tool bits to a 60 (or 29 angle with cutting rake — holds square cutters in sizes ¼

AUTO-ORDNANCE Corporation

THOMPSON TOOL DIVISION

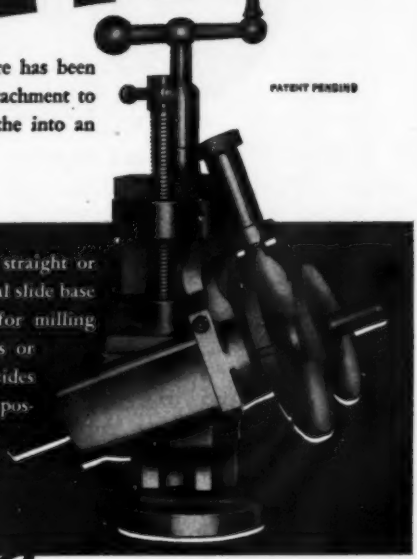
342 WEST PUTNAM AVENUE GREENWICH, C

Thompson

UNIVERSAL
MILLING FIXTURE with the 3 way circular swing...

e Thompson Universal Milling Fixture has been igned specially for quick and easy attachment to standard bench lathe — converts lathe into an cient, time-saving milling machine.

PATENT PENDING

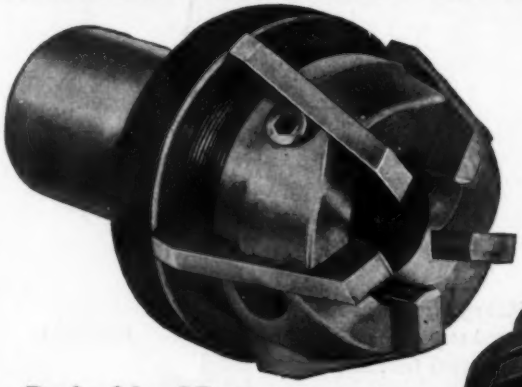


e "Thompson" lends itself readily to straight or gular milling by using vise and universal slide base thout index fixture. Used efficiently for milling inches, end mills, key ways, "C" bores or manufacture of duplicate parts — provides wide variety of applications. The many pos- le tool room or production applica- ons of the "Thompson" assures many orthwhile savings. It will pay you to rite for further information.

UTO-ORDNANCE Corporation

THOMPSON TOOL DIVISION
WEST PUTNAM AVENUE GREENWICH, CONN.

GENESEE ADJUSTABLE HOLLOW MILLS ARE BREAKING PRODUCTION RECORDS NOW JUST AS IN WORLD WAR 1



Backed by 35 years experience our entire facilities are devoted to the manufacture of inserted blade Genesee **ADJUSTABLE HOLLOW MILLS,** Facing and Counterboring Tools and Special Production Tools.

Our standard line of Hollow Mills include 16 style and sizes from 0 to 2 inches; larger sizes upon request.

Our Engineering Department is always ready to serve you in your Production Tool problems.

Write for complete Catalog No. 42.

GENESEE MANUFACTURING CO., INC.
MANUFACTURERS OF
GENESEE PRODUCTION TOOLS
ESTABLISHED 1908 ROCHESTER N Y U S A

A New Use
for Procunier Tapping Machines
Speeds Up Assembly Output Tremendously

By using a specially constructed tapping head, this Procunier Tapping Machine becomes an effective assembling unit. Items are assembled in a fraction of the time formerly required—and all to a uniform degree of tension. Then, if desired, the set-up can be quickly transformed back into a standard tapping machine. This unit here illustrated is being used to assemble caps and tail mechanism for military equipment. Many similar types of assembly jobs can be handled.

Have Many Advantages

Procunier Universal Tapping Machines give increased output, more accurate tapping and tremendously increased tap life. The features that make this possible include: 1. Four speeds, ranging from 390 to 2050 R. P. M. efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2, One machine handles tap sizes from No. 2 to ½" through two interchangeable heads. 3. Extra long Spiral Compensating Springs conveniently located, with wide range hand screw adjustments, maintain preset tap feeding and reversing pressure INDEPENDENT OF OPERATOR.

Send for Catalog

giving full details, description and prices on the full line of Procunier Universal Tapping Machines, hand or foot operated, the complete line of Procunier Precision Tapping Heads to meet all needs and the new Tru-Grip Tap Holder.

PROCUNIER SAFETY CHUCK CO.
14 S. Clinton St., Chicago, Ill.

PROCUNIER

Procunier Safety Chuck Co.
14 S. Clinton St., Chicago, Ill.

Send me bulletins on: // High Speed Tapping Heads // Tru-Grip Tap Holders // Universal Tapping Machines.

Name .....

Address..... City..... State.....

They may all *start* together—but they don't *stay* together!

EVEN though all carbides may look alike to a user in the beginning, eventually one manufacturer's will nose out in front of the others in his estimation. This is especially true in the fast production race of today, when even a slight difference in cutting qualities may mean a substantial increase in the user's output.

There are, of course, definite differences among carbides, based on the inevitable human element in their production. Length of experience . . . rigidity of control in grinding, mixing and sintering . . . skill in tipping and grinding . . . strictness of inspection—all these have their effect on the finished tool.

Many of the most prominent metal-working concerns in the country are convinced that TECO CARBIDE TOOLS hold their cutting edges longer, cut at higher speeds and produce more pieces between grinds than any similar material. And a recent increase in our facilities, tripling our output of carbides and doubling our tool production, enables us to offer exceptionally prompt shipment of orders.

TUNGSTEN ELECTRIC CORPORATION • 565-39th St., Union City, N. J.

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects and Builders Bldg., Indianapolis, Ind.

TECO

Pioneers in Tungsten Carbides for over a Quarter Century

TECO

CARBIDE TOOLS

OEM Photo by Hollom

NOW YOU MUST LEARN "HOW-TO-DO-IT"

BETTER..CHEAPER..WITHOUT WASTE

CAN YOU USE HELP?

We have available a new motion picture and a booklet (soon off the press), both on "*Stainless Steel Welding.*" Also for your production men, a complete "*Handbook of Special Steels.*" For your engineers, certified "*Blue Sheets*" on each tool and stainless grade. For your apprentice or training courses, "*Elementary Discussions on Tool and Stainless Steels.*"

● Write for the informational help you need. In addition, the personal assistance of our Technical Staff is at your call.

PRODUCING constantly improved war goods at a diminishing rate of cost, and an increasing rate of speed, ordinarily wouldn't be much of a trick for America. It's right up our industrial alley.

But conditions today are not as usual. There is no inexhaustible ocean of materials. There is, instead, a controlled stream flowing through rigidly restricted channels. We have to do *more*, actually, with *less*.

Thrift is especially essential with the vital steel alloys. If you use alloy steels in *any* form, check your dies, your cutting tools and machine set-ups, your heat-treat and welding methods—check and recheck every operation to reduce rejects, spoilage, undue scrap, or any other form of waste. Above all, carefully segregate and classify your unavoidable alloy steel scrap (*that is the only way the mills can reclaim it*) and rush it back into the useful cycle.

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

COVER MORE GROUND

with

You can cover an astonishing lot of ground in area, work handled and output — with a WALKER-TURNER RADIAL DRILL. Handles all light drilling, tapping and routing at any point within a 62" circle. Spindle speeds from 160 to 8200 r.p.m. Distinct advantages are: 1—Prompt shipment to war industries. 2—Compactness permits installation at any point in production line. 3—Women operators find them easy to operate and unskilled labor can learn to handle them with very little breaking-in. 4—Standardization and quantity production permit an exceptionally reasonable price for a machine tool of high quality of design and materials. Send for literature.

walker-Turner Radial Drill

WALKER-TURNER COMPANY, INC.
17122 Berckman St., Plainfield, N. J.

Small diameter holes (up to ½"), a large area to be covered and a heavy, cumbersome jig makes an ideal set-up for a WALKER-TURNER RADIAL DRILL.

(Photo courtesy Lewyt Metal Products)

walker-Turner COMPANY, INC. PLAINFIELD, N.J. U.S.A.

MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

For boring of steels . . .
use KENNAMETAL* single point tools

Tom the foreman says:

KENNAMETAL* Eliminates Multiple-Blade Cutters

"We have found in our shop that since the advent of KENNAMETAL, ...ltiple-blade cutters are no longer necessary to bore steel and we feel it ...r duty to pass along this production discovery to all plants which are ...oring steels on war jobs.

"Many shops are still using the antiquated multiple-blade type cutter in...erited from the days of tungsten steel boring tools.

"When carbide cutting tips came into existence, shops eliminated the old ...ring tool design. They failed to realize that a KENNAMETAL tip need ...t share the cutting load with a number of other blades.

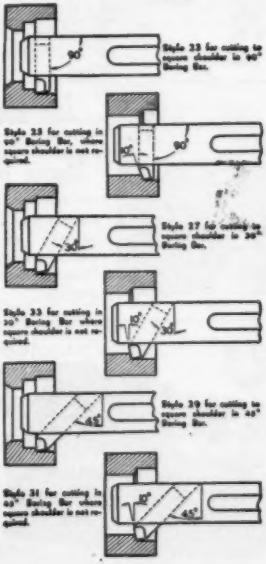
"When a single-point KENNAMETAL boring tool is used on our ordi...ary boring bar it holds a truer bore than two or four blade tools do. It can ...run six times faster and ¼ the feed per revolution as is necessary with a ...o blade high speed steel cutter. This gives only half the force tending to ...flect the boring bar. Furthermore, this single point KENNAMETAL bor...g tool can be ground off-hand, whereas a multiple-blade cutter must be ...round on a cutter grinder and costs less than one-tenth as much as the ...o-blade type.

"In addition, the single-point boring tool with a small nose radius reduces ...tter caused by tool pressure and can be positioned more easily than the ...ultiple blade type tool.

"The operation diagrams at the right show standard boring applications ...f KENNAMETAL tools which can be ordered direct from the McKenna ...etals Company catalog, at a small fraction of the cost of a multiple blade ...tter despite the fact that the single-pointed tool can turn out more work."

Write for your copy of the new Catalog No. 43.

...NVENTED AND MANUFACTURED IN U. S. A.


Style 23 for cutting to square shoulder in 90° Boring Bar.
Style 25 for cutting to 90° Boring Bar, where square shoulder is not required.
Style 27 for cutting to square shoulder in 90° Boring Bar.
Style 33 for cutting to 90° Boring Bar where square shoulder is not required.
Style 29 for cutting to square shoulder in 45° Boring Bar.
Style 31 for cutting to 45° Boring Bar where square shoulder is not required.

McKENNA METALS Co
135 LLOYD AVE., LATROBE, PENNA.

IDEAL Ways to Speed War Production

1 IDEAL LIVE CENTER

TAKE DEEPER CUTS AT HIGHER SPEEDS

IDEAL Live Centers permit deeper cuts at higher speed, carry heavier loads, because they rotate with the work. Radial load carried by high precision ball bearings, thrust load absorbed by high precision taper roller bearing. All parts hardened and ground.

TRIPLE DUTY

3 Interchangeable Center Pieces.

For all centered and uncentered work.

2 IDEAL BALANCING WAYS

10" Swing
20" Swing
42" Swing
60" Swing

Speed-up balancing of pulleys, flywheels, etc. No time wasted finding centers. No leveling or set-up required.

3 IDEAL MARKING TOOLS

Prevents production delays due to theft, mistakes, confusion

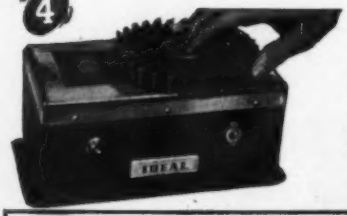
Electric Markers

Permanently marks all materials; glass, metals, ceramics. Make 7,200 cutting strokes per min. Diamond Point for hard materials.

Electric Etchers

Permanently mark iron, steel and their alloys. New, "Machine Shop" model has 14 etching heats. Other models for fine or heavy etching.

4



IDEAL DEMAGNETIZERS

Keeps Tools Sharp Longer

Powerful—portable. Quickly demagnetizes work held in magnetic chucks, tools, drills, punches, dies, etc. Abrasive particles practically disappear after a single pass across the magnetic poles. Demagnetized tools cut faster because they do not bind, heat, and dull quickly.

FREE Machine Tool Accessory Catalog
Gives information on these and other time-saving tools.

IDEAL COMMUTATOR DRESSER COMPANY
1441 Park Avenue, Sycamore, Illinois

Sales Offices in All Principal Cities
In Canada: Irving Smith, Ltd., Montreal, Quebec

...get FASTER more ACCURATE TENSION TIGHTENING...

...USE MOSSBERG TORQUE TOOLS!

BECAUSE they're made in 4 calibration ranges, dial gauge graduations on Mossberg Torque Tools are larger, more widely spaced. Assemblymen can read 'em easier . . . measure nut and bolt tensions on motors and other important assembly units faster, *more accurately!*

EXAMINE the improved, inside-the-handle dial mounting of Mossberg Torque Tools and you'll see another reason why they control tensions more accurately. This rigid mounting protects dials from bumps and jounces that might knock them out of adjustment.

WIDELY USED both for production and experimental laboratory work by the U. S. Navy – by plants turning out airplanes, tanks, battleship turbines and by submarine builders – Mossberg Torque Tools have *proved* 98% accurate under most severe conditions. Write today for complete information on sizes and prices!

APCO MOSSBERG COMPANY

155 Lamb Street, Attleboro, Massachusetts

Watch for chip color

Listen for machine laboring

Feel for maximum load capacity

THESE three senses tell every machinist when tools are working at their best! And Color, Sound and Feel can be controlled—down to the *last chip*—by a Given Vari-Speed Drive. Brings every cutting application up to maximum efficiency—no sacrifices between speeds—no approximation of correct speeds but complete variable control from one end to the other, PLUS 30% more r.p.m. without losing the original slow speeds!

Given VARI-SPEED DRIVE

Brackets for any requirement . . . simple to mount by drilling four bolt holes. Send your list of tools for recommendations.

GIVEN MACHINERY CO., 3857 Santa Fe Ave., Los Angeles, Calif.

Simple "PACKLESS" construction keeps these valves on the job without maintenance

Hannifin Air Control Valves all have the simple disc-type design that gives positive, accurate control of air operated equipment, plus the advantage that there is no packing—and no leakage or packing maintenance troubles. The bronze disc that controls air flow is ground and lapped to form a perfect seal with the seat, which is similarly finished. Control is smooth-acting and positive. Wear is negligible, yet if necessary after long service, a simple relapping restores the original efficient seal.

Hannifin Valves are made in 3-way and 4-way types with various standard cycles of control, for use with single or double-acting cylinders. Available in the following models: standard hand control valves; duplex valves for control of two double-acting cylinders; spring return for instant reversal upon release of hand lever or foot pedal; heavy duty rotary valves; foot operated treadle valves; electric models for remote control; manifold type for control of several units; pressure regulating valves.

Write for Bulletin 57-H with complete data on all types.

HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Avenue • Chicago, Illinois

HANNIFIN AIR CONTROL VALVES

JESSOP TCM HIGH SPEED STEEL

Speeds PRODUCTION
Conserves VITAL ALLOYS

Jessop TCM is a new molybdenum-tungsten high speed steel that fully replaces 18-4-1.

Jessop TCM performs as well or better than 18-4-1, and the initial cost is less.

Jessop TCM is heat treated in the same equipment and the same atmosphere as 18-4-1.

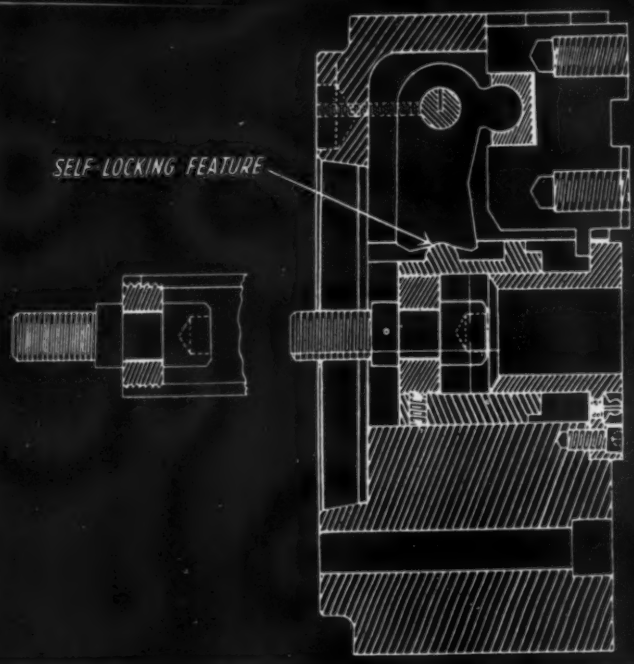
Jessop TCM conserves vital alloys and speeds armament production.

Write for descriptive literature.

JESSOP STEEL COMPANY
WASHINGTON, PENNA. U.S.A.

JESSOP STEELS FOR AMERICA AND HER ALLIES

CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · COMPOSITE STEELS



A Different Air Chuck

ll-locking, double-power, ee jaw "Airgrip" chuck y Anker-Holth Mfg. Co.

Self-locking both ways—double-gripping power—lower air consumption! These are among the features of Anker-Holth Air Operated Universal Three Jaw Chucks—*the air chucks that are different.*

The exclusive design of Anker-Holth chucks permits heavier cuts and coarser feeds. The wedge action of the cam on the bottom of the levers—operating in both directions—more than doubles the gripping power obtained through leverage alone. The jaws lock securely, whether gripping externally or internally. Work is held tightly, should the air pressure drop or be cut off entirely.

Anker-Holth Air Chucks give you more power when you need it. And, that extra power means you can reduce air consumption by using smaller cylinders. *Write for Bulletin Today!*

Anker-Holth Mfg. Co.

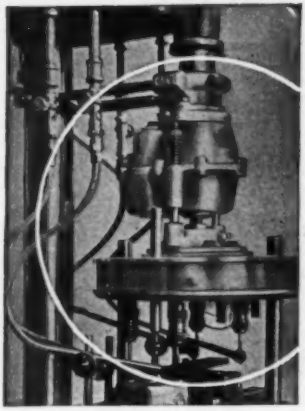
"AIRGRIP" CHUCK DIVISION

332 So. MICHIGAN AVE. • CHICAGO, ILL.

IMPORTANT—to users of

Ettco-Emrick

MULTIPLE DRILLING and TAPPING HEADS



Nothing is more important to the war effort than maximum production in an uninterrupted flow. In view of this we want to stress the following points regarding the use and care of Ettco-Emrick Multiple Drilling and Tapping Heads.

1. Your Ettco-Emrick Multiple Drilling or Tapping Head is an individualized piece of equipment. It was engineered to give you **maximum** drilling or tapping production on a specific part. With it, you received recommendations as to the best way to handle parts, the most effective design of work holder, the proper drills or taps to use and the proper operating speed. To get the intended production, all of these recommendations must be followed. If in doubt on any point, ask us.

2. Don't attempt to use any but the drill or tap chucks supplied with the heads.

3. These Heads are high-speed, precision-made tools and, like any such tool, must be given a certain amount of care. For example, the gear case requires a good grade of grease—but not too much. Again, when in doubt on any point, ask us.

4. When replacements become necessary, don't attempt to make them yourself. The quickest and surest way is to return the Head to us. These heads are made of standard parts which we have in stock.

5. Remember, we are at all times ready to help you get the high production and excellent service these Heads give when properly used and cared for.

IMPORTANT—To Non-Users

If you need higher production in drilling or tapping, find out what Ettco-Emrick Multiple Drilling and Tapping Heads will do for you. These Heads will make every one of your drill press or tapping machine spindles do the work of many, by providing the means for drilling or tapping 2 to 12 holes simultaneously, depending on hole sizes and center distances. Copy of Bulletin No. 3 giving details will be mailed to you on request.

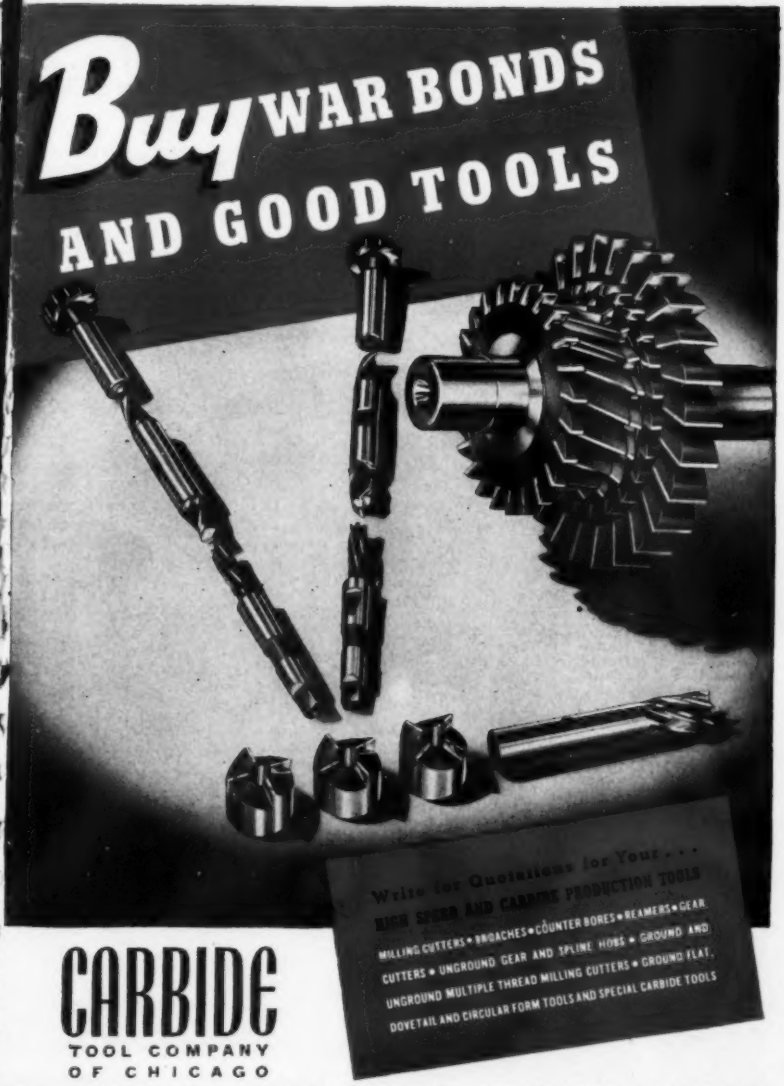
ETTCO TOOL CO.

596 Johnson Ave., Brooklyn, N. Y.

Detroit ● *Chicago*

The Famous Ettco-Emrick

DRILL CHUCKS • TAP HOLDING CHUCKS
TAPPING ATTACHMENTS • TAPPING MACHINES
MULTIPLE SPINDLE TAPPING AND DRILLING HEADS
Unexcelled for Design, Materials and Workmanship


Buy WAR BONDS
AND GOOD TOOLS
Write for Quotations for Your . . .
HIGH SPEED AND CARBIDE PRODUCTION TOOLS
MILLING CUTTERS • BROACHES • COUNTER BORES • REAMERS • GEAR
CUTTERS • UNGROUND GEAR AND SPLINE HOBS • GROUND AND
UNGROUND MULTIPLE THREAD MILLING CUTTERS • GROUND FLAT,
DOVETAIL AND CIRCULAR FORM TOOLS AND SPECIAL CARBIDE TOOLS

CARBIDE
TOOL COMPANY
OF CHICAGO
816 NORTH KOSTNER AVENUE, CHICAGO, ILLINOIS

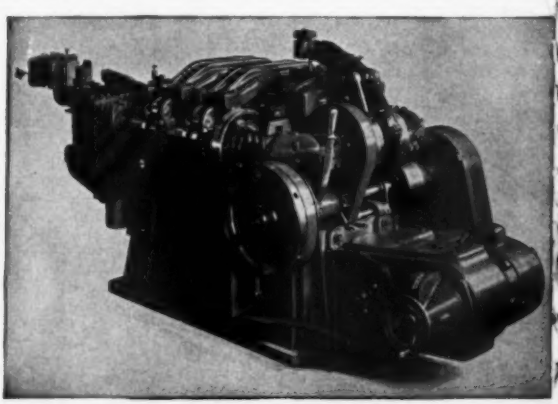
...AND PASS THE AMMUNITION!

The call for more "ammunition" to supply our worldwide battle fronts is being met at home by the increased production speeds being attained in American munitions plants. In these plants—producing essentials of war that range from guns to aircraft engines, to precision instruments—U. S. Multi-Slides are doing their part.

These U. S. Multi-Slides are well suited for the fabrication of metal parts from coiled stock. Parts calling for piercing, swaging, embossing, blanking and forming are produced complete in the machine.

A particularly interesting application at this time is the fabrication of bullet-holding links for use in machine guns and aircraft cannon.

For complete description of the U.S. Multi-Slide, write for Bulletin No. 15.

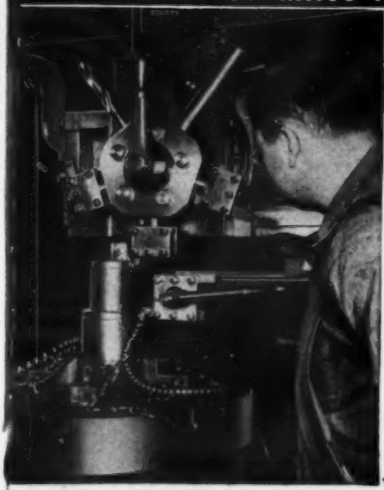


U.S. Tool Company, Inc., Ampere (East Orange) New Jersey. Manufacturers of U. S. Multi-Slides, U. S. Multi-Millers, U. S. Automatic Press Room Equipment, and U. S. Die Sets.

U. S. Multi SLIDE

g a line-up of
"Perfect 36's"
out urgently
parts at one of
a's largestship-

HOW ROGERS "*Perfect 36*" VERTICAL TURRET MILLS STEP-UP MASS PRODUCTION OF CARGO AND NAVAL SHIPS . . .



e shows Rogers Swivel Side Head and Main
turning the work.

CONDENSED SPECIFICATIONS
' diameter machining capacity
aw horizontal chuck
ible to turret 23" maximum
pid power driven main head and rails
ot-operated controls
ardened and high speed models

Two machining operations at the same time are possible with Rogers Swivel Side Head and Main Vertical Head. ***This doubles production.***

ADJUSTABLE FIVE-POSITIONED MAIN VERTICAL TURRET provides 5 tool settings for boring, drilling, reaming, turning and thread cutting. Rogers Main Head is adjustable up to 30° each side of vertical.

ROGERS SPECIAL SWIVEL FOUR-SIDED EIGHT-POSITIONED SIDE HEAD is designed to permit setting at any angle up to 35° each side of horizontal to simplify tool setting for machining irregular shaped pieces.

Horizontal chuck provides easier, faster chucking and machining. "Machine It on the Level" with a Rogers.

Write for the facts today.

Surprising QUICK DELIVERIES and ATTRACTIVE PRICES

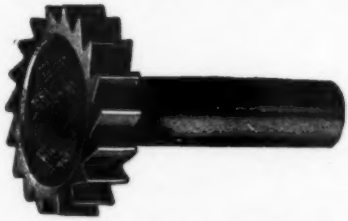
Knowing How Since 1885

ROGERS
MACHINE WORKS INC.
FACTORY: ALFRED, N. Y.
SALES OFFICES: 129 ARTHUR ST. BUFFALO N. Y.

Immediate Delivery NOW!

High Speed R.H. Spiral

Single or Double END MILLS—2 or 4 Flute, up to ¾" Double End—⅞" Single End.



High Speed Right Hand

FastCut Woodruff Keyseat Cutters
All Sizes From "201" to "G"
Special Sizes Made to Your Blue Prints

High Speed Center Drill

FastCut Combined Drills and Countersinks
Both in Standard & Bell (Safety) Type Center Drills
Special Sizes and Angles Made to Order

Catalogue Sizes at Standard Prices

ASH & COMPANY

Cutting Tools—Factory Supplies

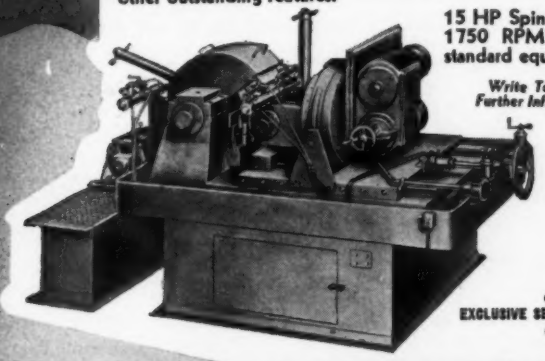
3845 Grand River **Phone Temple 2-6363** **Detroit, Mich.**

ZEPHYR CENTERLESS GRINDER

MODEL M-2

The Model M2 is a precision motor driven grinder of the centerless type; centerless grinding requires no centers, the work being supported by a work rest as it passes between the grinding wheel and the regulating wheel. This machine is of the latest design and is rugged in construction, free from vibration, noise and shock. All controls are easily located and accessible to the operators normal working position.

Cabinet designed base of welded steel; carefully hand scraped ways; Timken bearings thruout, multiple V belt direct from motor; completely sealed bearing cartridge are a few of the other outstanding features.



15 HP Spindle Motor, 1750 RPM comes as standard equipment.

Write Today for Further Information.

EXCLUSIVE SELLING AGENTS

H. LEACH MACHINERY CO.

387 CHARLES ST. PROVIDENCE, R. I.

ENCO Lathe Turrets Offer New Features and Extra Value

Advanced design at low price levels is found in every "ENCO" Turret.

An actual tool set-up on an ENCO Model "B" Tailstock Turret.

Accurate Tailstock Turrets

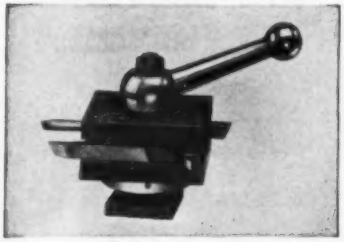
Ideal for engine and bench lathes—for special runs, small runs that come through regularly, or for relieving turret lathes. Holds six tools and comes complete with tapered arbor that fits in tailstock. Can be had with straight shank for increasing tool hole capacity on turret lathe. Tool holes are bored, after arbor is fitted to insure accurate centering of tools. Saves time in tool changing and chucking. Quickly pays for itself. Recommended by many users. Order from your dealer or write for circular.

Model "A"—2½" dia. with No. 1 or No. 2 Morse Taper arbor and 6 bored ⅝" tool holes $18.95

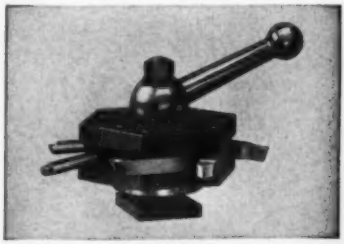
Model "B"—5" dia. with No. 2 or No. 3 Morse Taper arbor and 6 bored ⅞" tool holes; or with No. 4 Morse Taper arbor and 6 bored 1" tool holes $32.95

Model "B1"—5" dia. with 1" straight shank arbor and 6 bored 1" tool holes, for use on Turret Lathes $37.95

Enco Turret Tool Posts—for Bench and Small Engine Lathes



Model "S"—Four tool, 8 position Turret Tool Post 2½" sq.. $23.00



Model "H"—Six tool, 12 position Turret Tool Post, 3" Hex. $25

The new "ENCO" adjustable Turret Tool Posts for Bench and small Engine lathes and small screw machines are carefully engineered lathe accessories that have many advantages: There are two positions for each tool, giving 6 and 12 positions on the Four and Six tool, Turret Tool Posts, respectively. Take standard square tool bits and boring tools.

Head can be raised or lowered to center tools. Turret is rigidly mounted in T-slot of compound. Indexing is easy, accurate and positive. Indexing mechanism is self-contained, eliminating all possibility of chip interference. Case-hardened steel construction. Eliminates many second operation set-ups. When ordering, give make of lathe and swing.

E & N Manufacturing Co., Dept. C., 3321 Montrose Ave., Chicago, Ill.

Number 22

NOW . . . A NEW STAR for every Cutter and Tool Grinding Performance

New member of a long line of Covel Grinders, this No. 22 Universal Cutter and Tool Grinder moves into the spotlight for your inspection and approval.

FAST, ACCURATE and FLEXIBLE for TODAY'S TOOLS — and TOMORROW'S

So that you may have complete details and pictorial description of this greatest of Covel Cutter and Tool Grinders, an attractive booklet portraying the advantages of this truly universal machine is now ready for release. And when you see for yourself the scores of No. 22 advantages and advancements, you'll agree that here is the Cutter and Tool Grinder of tomorrow—ready TODAY.

Write, wire or phone Now for your copy of Bulletin MT112 and name of dealer nearest you. Early deliveries to Essential War Industries.

Grinding Machinery Since 1874

COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICH.

GRINDING SET-UPS LIKE THIS *Mean* LOST MAN HOURS . . . LOST MACHINE HOURS

You Can Be Sure of *FULL* PRODUCTIVE GRINDING TIME When You Use The MAGNA-SINE

The angular grinding set-up on the Magna-Sine, as shown at the right, was completed in *one-twelfth* the time required for that shown above. It eliminated the need for V-blocks, angle plates, sine bars, clamps and strap.

In addition to reducing set-up time to an absolute minimum, the Magna-Sine's precision construction makes possible the most accurate angular grinding work. Every angle is held to the same accuracy as the standard gage blocks which are used.

Magna-Sines are supplied in two sizes in both compound, and single angle models. Non-magnetic models are also available for inspection purposes.

Write for full details.

ROBBINS ENGINEERING COMPANY

318 MIDLAND AVENUE • DETROIT, MICHIGAN

PUMP PARTS PRECISION BORED IN 25 SECONDS

SIMPLEX PRECISION BORING MACHINE MAINTAINS ACCURACY AND FINISH

This prominent mid-western manufacturer, when switching from non-essential production to a wartime job, installed Simplex Unit-type Precision Boring Machines for all boring operations requiring a high degree of finish and accuracy.

This two-way or duplex-type machine is used to bore from both sides of the pump housing simultaneously. Diameters are held to ±.0005", insuring precision fits to bearings and oil seals.

SPECIAL PRECISION BORING MACHINES WITH GENERAL PURPOSE VERSATILITY

Simplex Precision Boring Machines are designed with adjustable units so that either short-run precision boring or production boring can be accomplished. Spindles are adjustable, and the machines can be provided with one or more spindles as desired. Over 25 different basic models of Simplex Precision Boring Machines have been designed to meet practically any type of precision boring problem.

Our engineers will be glad to make a study of your parts and production for faster and better precision boring.

Send part prints and production figures . . . no obligation.

PRECISION BORING DATA

PART—Pump Housing.

MATERIAL—Cast Iron.

HOLDING METHOD—Special Holding Fixture.

MACHINE—#2U 2-Way Simplex Precision Boring Machine.

OPERATIONS—Precision Bore Bearing and Oil Seal Fits and Chamfer One Bore.

TOLERANCES—±.0005" Dia.
—±.005" Depth.

FEED—1¼" per Minute.

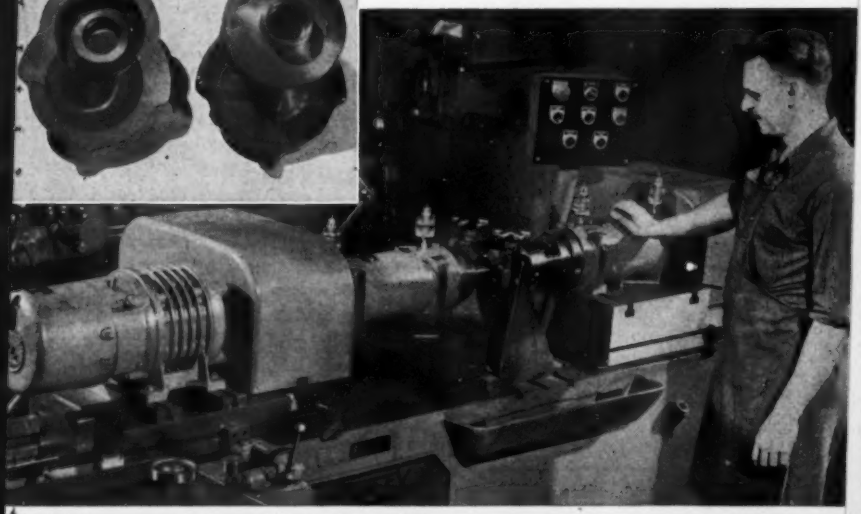
SPEED—1150 r.p.m.

FLOOR-TO-FLOOR TIME—8 Minutes, including inspection.

FREE DATA

Write for these two booklets covering our complete line of precision boring machines. Complete specifications of each type are included. Ask for Precision Boring Machine booklets.

PRECISION BORING FROM TWO SIDES SIMULTANEOUSLY



STOKERUNIT CORPORATION

DESIGNERS AND BUILDERS OF PRECISION BORING MACHINES AND MILLING MACHINES

4530 WEST MITCHELL STREET • MILWAUKEE, WISCONSIN

there IS a difference in taps

4 good reasons why

SOSSNER taps last longer and cut more perfect threads

CUTTING . . . Sossner taps are carefully fluted and mirror polished to precise depth and width for maximum strength, minimum friction, and best cutting angle.

STRUCTURE . . . All Sossner taps are heat-treated in time-temperature-atmosphere controlled furnaces!

PRECISION GROUND FROM THE SOLID STOCK . . . All Sossner taps are ground to micro-finish from the hardened solid blank using the very latest equipment and our own newly developed methods.

ACCURACY . . . EVERY tap is measured with precision wires on master measuring instruments calibrated to .0001 in. Only the most modern and accurate equipment is used to check the form and lead.

TAPS AND GAGES OF AMERICAN NATIONAL AND BRITISH THREAD FORMS IN SPECIAL AND STANDARD SIZES

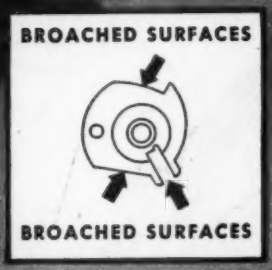
Write to SOSSNER 225 Centre St., N.Y.C. or 26 B'way, Lynbrook, N.Y.

TAPS GAGES **SOSSNER** STEEL STAMPS CUTTING TOOLS

"32 year reputation for reliability and precision workmanship."

The job that **Only**

DETROIT BROACH would tackle



Shown above is the broached drive bushing in actual size.

The line drawing at the right is three times size.

THIS was a job that was labelled "impossible" as a broaching operation. Detroit Broach engineers believed that it could be done . . . the broaches were designed and manufactured . . . and these tools have, for many months, been in constant use for the production of the part illustrated above.

This broached part is the main drive bushing for the shutter mechanism of one of the finest cameras manufactured in this country. In the broaching of the entire contour, all surfaces must blend and be in proper relation to each other. The entire operation is held to extremely close tolerances.

This is only one of many tough broaching problems solved by Detroit Broach engineering ability . . . production facilities . . . and efficient "follow-thru."

DETROIT BROACH COMPANY

20201 SHERWOOD AVENUE • DETROIT, MICHIGAN

Special
CUTTING TOOLS
MADE TO
CUSTOMER'S
PRINTS

aces

For your specially designed cutting tools, A.C.E. offers a highly specialized experience to insure exact reproduction and rigid inspection that minimizes rejects. Many of the nation's leading industries use A.C.E. special cutting tools regularly. Integrity of product is our watchword.

Send us your prints for estimate.

NOTE:- We do not make tools for stock.

AMERICAN CUTTER & ENGINEERING CORP.
31741 Mound Road, Warren, Mich.

AMERICAN CUTTER
AND ENGINEERING CORP., WARREN, MICH.

SPECIALIZING IN HIGH SPEED CUTTING TOOLS TO YOUR PRINTS

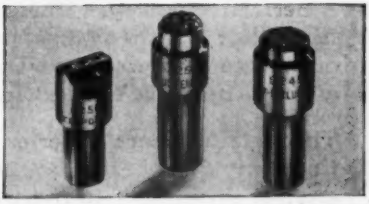
Meyers "Dia-brasive" Radius-Angle Former

Upright shaft for adjusting diamond holder to various vertical positions.
Automatic diamond locating device.
Adjustable swinging diamond tool fashioned to outline full concave radius of 180°.
Dual-purpose tool holder supporting a vertical and horizontal nib.
Locking screw to hold swivel platen in desired position.
Screw driven elongated slide adjustable to .001" by attached graduated dial operated by spring clutch to desired reading.
Vernier graduated swivel platen insulated for rotation on magnetic chuck forms convex and concave radii outlines.
Crank for smooth manipulation.
Ball bearing graduated base platen slotted and centered for flexibility of installation is simply and quickly mounted.

Speedy, Precise Forming of Grinding Wheels *From Any Angle* Now Possible

★ A precision tool for economically forming radial and angular outlines on grinding wheels. Designed for simple, speedy operation from various settings, adjustable to precision, engineered for sturdy, dependable service. Vertical and straight diamond dresser nibs furnished as standard equipment.

Write or wire for literature and prices.



MULTIPLE DIAMOND POINT DRESSERS

Efficient—economical. Numerous sharp points are always exposed to work, or face of wheel. New points can be secured by turning dresser a quarter or half turn.

Aggressive Mfrs. Rep. wanted in South, East and West.

W. F. MEYERS CO., Inc. Dept. BB, Bedford, Indiana

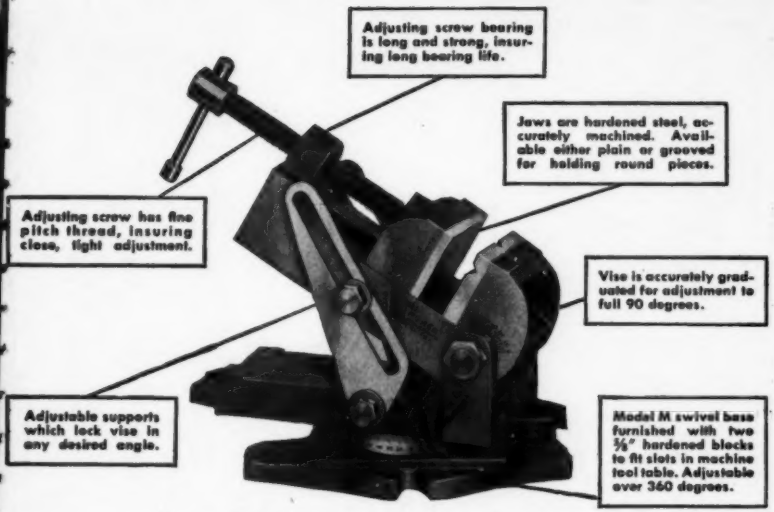
SPEED PRODUCTION

PREVENT MAN-HOUR LOSSES

● The importance of effective dust control in keeping production lines moving faster has been recognized by American Industry. Since the war began, the American Air Filter Company has supplied practically 100% of its output to war production plants and continues to work around the clock to meet industry's needs.

Through 20 years experience, the American Air Filter Company has developed atmospheric and process dust control equipment to meet *every* industrial need. Bulletins describing this equipment are available on request. Write today for "AAF In Industry"—there's no obligation.

AMERICAN AIR FILTER COMPANY, INC., 312 CENTRAL AVE., LOUISVILLE, KY.
IN CANADA: DARLING BROTHERS, LIMITED, MONTREAL, P. Q.


Adjusting screw bearing is long and strong, insuring long bearing life.
Jaws are hardened steel, accurately machined. Available either plain or grooved for holding round pieces.
Adjusting screw has fine pitch thread, insuring close, tight adjustment.
Vise is accurately graduated for adjustment to full 90 degrees.
Adjustable supports which lock vise in any desired angle.
Model M swivel base furnished with two ⅝" hardened blocks to fit slots in machine tool table. Adjustable over 360 degrees.

This New-Type Vise Will Do Hundreds of Jobs in Your Plant

Drilling . . . Milling . . . Grinding . . . Filing . . . Fitting . . . Marking
On Your Production Line . . . In Your Tool Room . . . On Your Benches

● Vises, as we know them, have been just vises for over a hundred years. But the Palmgren Angle Vise is a new-type vise designed and constructed to meet present day requirements on the production line, in the tool room, on the bench—on all particularly difficult angle jobs.

The features emphasized above and described below will verify this statement.

It can be used on a drill press, a milling machine, or a grinder, eliminating clamps, wedges or other make-shift methods, and permits setting up for angle work accurately and quickly.

It can be set at any desired angle up to a full 90 degrees by adjusting it to the proper degree and locking the adjustable supports.

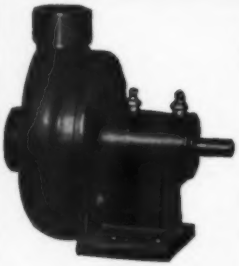
Every part of this vise is accurately machined. The base, body and sliding jaws are of semi-steel castings. The jaws are hardened steel and can be supplied either plain or grooved.

It can be used as a bench vise with or without two different auxiliary bases. Note the specifications below. If your local supply house does not have Palmgren Angle Vises in stock, send us his name and we will see that you are supplied with reasonable promptness, assuming that the order can be placed under the proper priority.

Model	Width of Jaws	Depth Jaws	Opening Jaws	Overall Length	Kind of Jaws	Weight Vise Only	Can be supplied with Model M or Model B swivel base or without base.
880	2½"	1 7-16"	2½"	6¼"	Hardened Grooved	9½ lbs.	

CHICAGO TOOL & ENGINEERING COMPANY
8384 South Chicago Avenue • Chicago, Illinois
Manufacturers of Palmgren Products for Over 25 Years

PALMGREN ANGLE VISES



CENTRIFUGAL PUMPS

Coolant pumps of neat, well-balanced design and compact construction. Simple. Dependable. The centrifugal action insures pumping at all times regardless of chips or grit.

Belt driven or directly connected to motor. Pipe sizes ⅜" to 1½". Standard or special types.

Speedier Work

• •

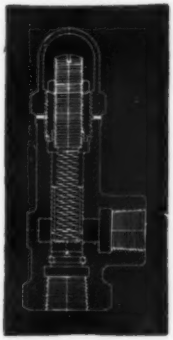
Lower Costs

TRADE MARK FULFLO REG. U.S. PAT. OFF.

COOLANT PUMPS

• • •

BY-PASS VALVES



OIL-RELIEF VALVES

Chatterless because of the cylindrical action which closes off the port in a shearing manner and does not close abruptly against the seat. For oil hydraulic pumping units where specific pressures must be maintained.

Pipe sizes ¼" to 2". For pressures from 0 to 350 lbs.

New Catalog Now Ready

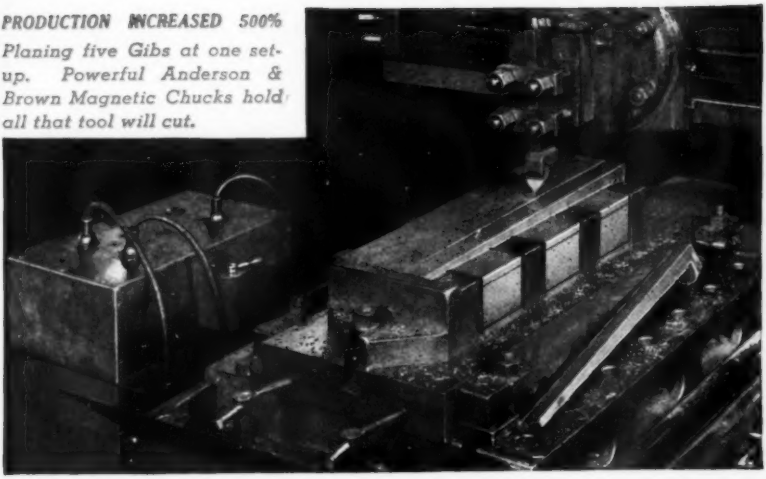
Just off the press . . . complete, mechanically illustrated with scale drawings of each model. Write for your personal copy.

THE TRADE MARK FULFLO REG. U.S. PAT. OFF. **Specialties Co., Inc.**

BLANCHESTER, OHIO

PRODUCTION INCREASED 500%

Planing five Gibs at one set-up. Powerful Anderson & Brown Magnetic Chucks hold all that tool will cut.



NOW—Super-Power Magnetic Chucks for Your Shapers and Planers!

Intense Holding Power and Flexibility of Anderson & Brown Magnetic Chucks Cut Your Production Costs

● The photo shows only one of the many time-saving applications of this remarkable new-type chuck. Utilizing the principle of "Magnetic Body Flo," this method of holding work goes far beyond the limitations of conventional magnetic chucks, providing *power* and *adaptability* not heretofore possible.

On all types of surface grinders, as well as planers and shapers . . . in the tool room and on the production line . . . hundreds of shops are now enjoying the amazing advantages of ANDERSON & BROWN Magnetic Chucks.

ILLUSTRATED CIRCULAR—FREE

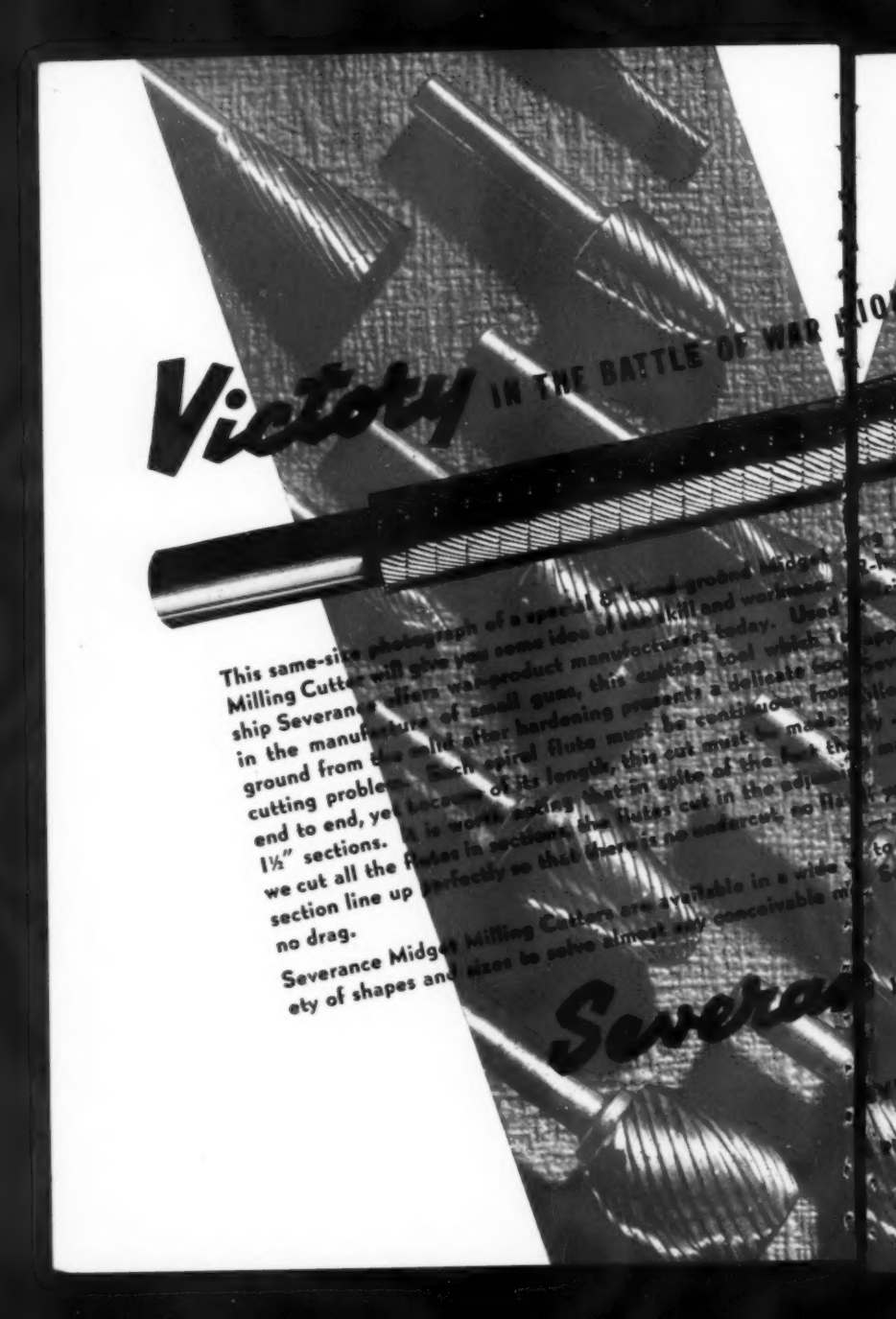
Learn more about how this magnetic chuck can save you time and money! Write for your copy of "Magnetic Chucking Revolutionized".

ELIMINATES COSTLY FIXTURES

The above jigs and several operations were eliminated from the job illustrated at top of page. Why not save the cost of fixtures and speed up *your* production with ANDERSON & BROWN Magnetic Chucks?

ANDERSON & BROWN CO.

2036 East 22nd Street, Cleveland, Ohio


Victory IN THE BATTLE OF WAR
This same-size photograph of a special
Milling Cutter will give you some idea of
ship Severance
in the manufa
ground from
cutting proble
end to end, ye
1½" sections.
we cut all the
section line up
no drag.
Severance Midget Milling Cutters are available in a wide
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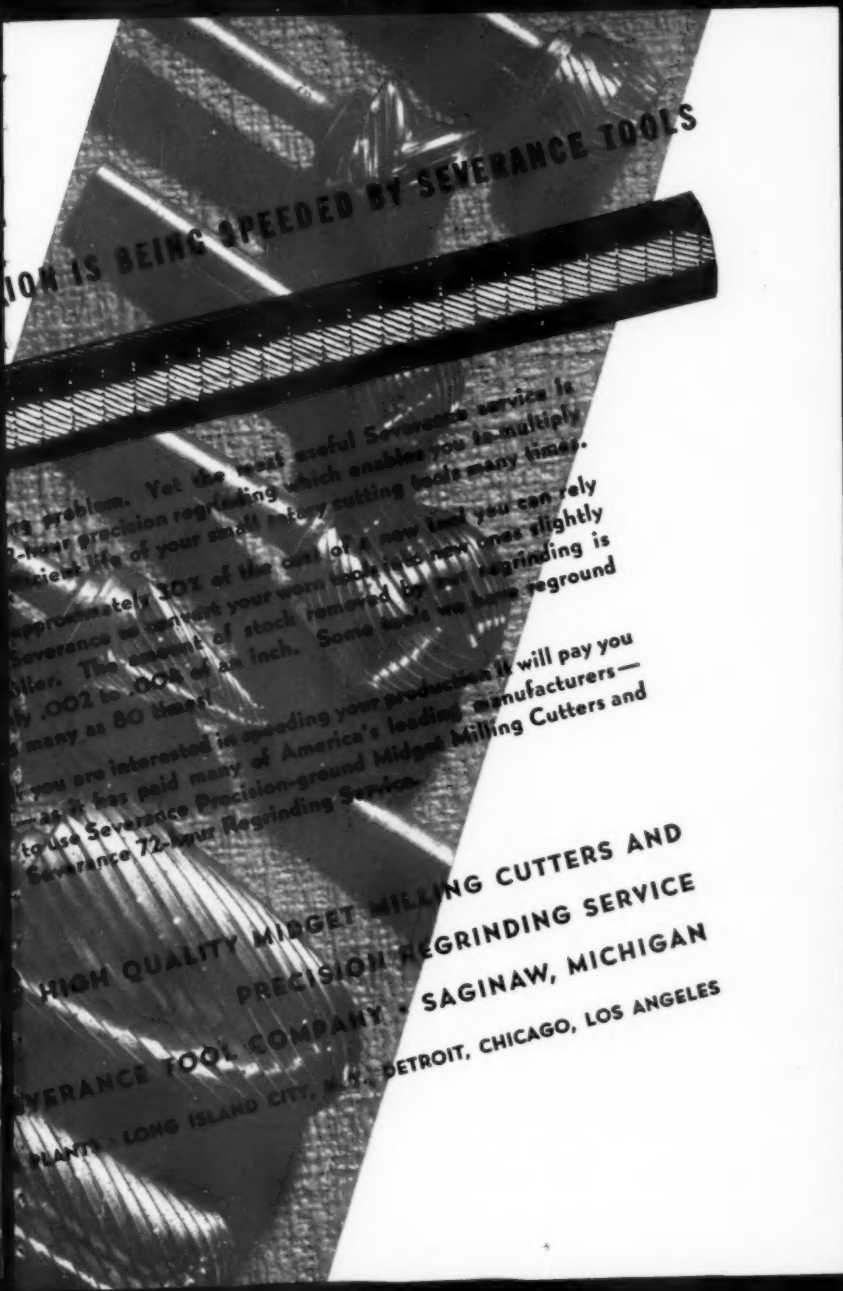
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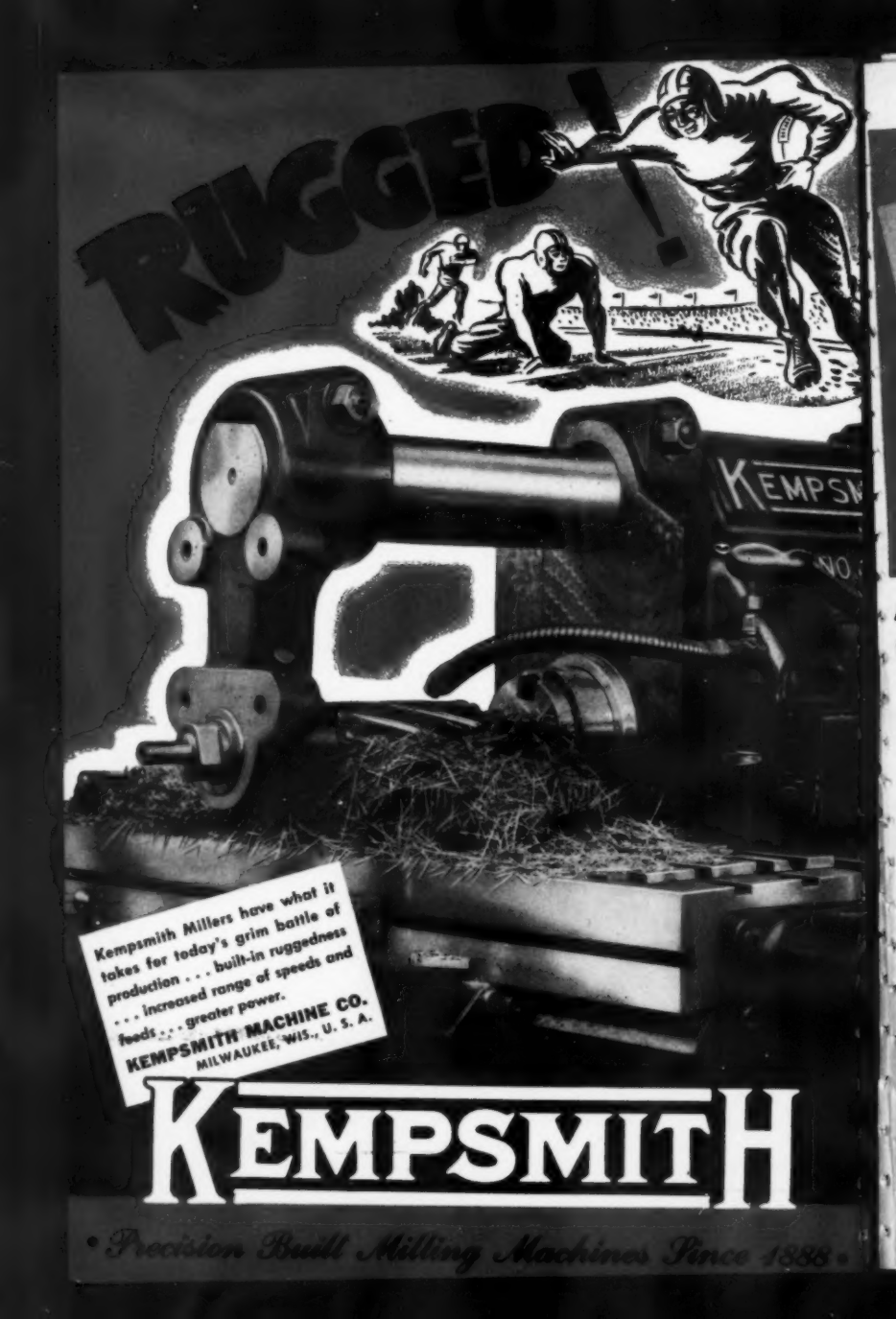
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SKILSAW TOOLS

MAKE AMERICA'S HANDS MORE PRODUCTIVE

Featured In This Issue

Materials handling is an important phase of our war production effort. The various types, developments and applications of Electric Hoists are described by C. A. Boecker, Hoist Engineer, American Engineering Co., Philadelphia, in his contribution starting on page ..... 71.

With many of our plants working around the clock, lighting is an important consideration. In many cases, a few simple, inexpensive changes can effect a great improvement in work illumination. Mr. Fairman discusses some of these points in his story beginning on page ..... 97.

The Center Scope brings to the job, the refinements of optical accuracy, eliminating the source of error in set-up work. H. A. Frommelt, Director of Industrial Research, Kearney & Trecker Corp., Milwaukee, tells just how the Center Scope is used, in the article commencing on page ..... 111.

The Power Hack Saw, by Carleton Cleveland, tells how this useful piece of shop equipment is working overtime to help the war effort, in the story commencing on page ..... 125.

Careful selection and maintenance of electrical equipment will go a long way in conserving critical materials. The discussion is by C. W. Fick, District Engineer, General Electric Co., Cleveland and it commences on page ..... 136.

The terminology of milling practice is the subject of John E. Hyler's fifth article in this series. Turn to page 147.

Things that should be observed in the use and care of Broaches . . . and a lot of things that should not be done with them, are discussed by Harry Gotberg, Chief Engineer, Colonial Broach Co., in his article on page 162.

Saving Manpower for Warpower—or in other words, safety in the shop, is the subject of Edwin Mottershead's fifth contribution to the Foremanship Forum. See page ..... 183.

Tool life can be extended materially by some of the modern methods of cleaning castings. One of these methods is illustrated and discussed in detail in the article beginning on page 166.

Industrial applications of X-Rays should be extended as a result of experiments which the General Electric Co. will conduct with the new 100-million volt equipment, described in the article commencing on page ..... 170.

Arc welded jigs and fixtures—subject of one of the prize winning papers in the recent Lincoln Arc Welding Foundation competition is discussed on page ..... 210.

A typical high mounting fluorescent lighting installation, with foot candle data on the distribution of illumination, is presented on page ..... 212.

Numerous helpful hints and interesting items will be found in the regular "Let's Talk Shop" section, commencing on page ..... 215.

Tooling Up for Victory presents the monthly parade of new machines, new production equipment and new methods, beginning on page ..... 240.

Blue Book's exclusive picture page —Mechanics Thru the Ages will be found on page ..... 310.

Additional plants available for subcontract work will be found listed on page ..... 326.

HOW TO GET THE MOST OUT OF YOUR LATHES

No. 3 in a series of suggestions made by the South Bend Lathe Works in the interest of more efficient production

Keep Your Lathes Level

The leveling of a lathe can either perpetuate or destroy the best craftsmanship of the machine tool builder. A lathe that is not level cannot turn out precision work. Any twisting of the lathe bed will throw the headstock, tailstock and carriage out of alignment. This will cause the lathe to turn a taper instead of taking a straight cut.

Check every lathe periodically to see that it is level

Check Leveling Frequently

The major cause of distortion in lathe beds is the settling of the floor supporting the lathe. There are other conditions which can also affect this. Therefore, check every lathe periodically to see that it is level.

How to Level a Lathe

The first requisite for accurate leveling is a precision level at least 12 inches long. One that is sufficiently sensitive to show a distinct movement of the bubble when a .003" shim is placed under one end of it.

The leveling of the lathe is tested by placing the level squarely across the lathe bed at both ends. Metal shims should be used under the lathe at the points indicated by the level as being low. After all adjustments have been made, bolt the lathe securely to the floor and repeat the tests to make sure that the lathe is still level.

A reliable leveling test can be made by placing a short bar of 1" steel in the chuck and machining two collars of equal diameter 4 inches apart. Then, take a very light finishing cut across both collars. Measure both collars with a micrometer. If the collars are not the same diameter it is an indication that the lathe is not level. Adjust the leveling until both collars can be turned the same diameter.

Write for Bulletin H3

Bulletin H3 giving more detailed information on the installation and leveling of lathes will be supplied on request. Also, reprints of this and other* advertisements and bulletins in this series. State quantity wanted.

*Ad. No. 1, "Keep Your Lathe Clean" Bulletin H1, "Keep Your Lathe Clean"
Ad. No. 2, "Oiling the Lathe" Bulletin H2, "Oiling the Lathe"

SOUTH BEND LATHE WORKS

South Bend, Ind., U. S. A. — Lathe Builders for 36 Years

As The Editor Sees It

THE headlines have been crowded lately with some of the most encouraging news of the whole war.

Rommel has been hot-footing it back across the desert, showing that the "master race" has no compunctions about deserting helpless allies and fleeing in utter confusion when the going becomes sufficiently tough.

Adolph has plenty more to worry about with the Allied invasion of Africa . . . another icy Winter in Russia . . . frequent blasting of Nazi war production plants . . . weary and disillusioned peoples in France, Italy and even along the Rhine.

Again the Jap navy has taken a terrific pasting with a heavy loss of personnel and equipment. A considerable part of the Jap fleet is in Davy Jones' locker . . . or badly dented.

In our exultation tho, we must remember that the Japs are entrenched in vast areas of the Pacific . . . that they still have enough ships to cause us plenty of trouble . . . that the Nazis yet have terrific striking power.

Quoting President Roosevelt, we have probably reached a turning point, but we cannot afford to relax in our efforts. Our gallant fighting men and their Allies have shown that they can do the job . . . if we continue to provide them with the weapons.

We cannot carry guns on the home production front . . . but our purchases of War Savings Bonds and Stamps will buy guns for our boys who can use them on the far-flung fighting fronts.

Wesley G. Paulson

OFFICIAL U. S. NAVY PHOTOGRAPH

Record-breaking service on an important Navy order, made possible by Ryerson cooperation on steel! "Without your assistance, it could not have been accomplished," writes the contractor — and again Ryerson teamwork scores.

Cases like this — in which quick Ryerson steel-service has speeded up war production — run into the thousands! While we have not kept count, enough Ryerson customers are working on war contracts to firmly establish Ryerson steel from stock as a vital part of the war production machine.

Hundreds of plants on war contracts are *depending* on Ryerson for steel. An important order here, too urgent to wait on mill production; a few bars there; some strip or a few sheets somewhere else. It multiplies into tremendous tonnage—all labeled "RUSH"— and it's all going into tanks, planes, guns and ships to beat the Axis!

It is a source of pride to the Ryerson organization that its One Hundredth Year finds it on the direct line of greatest service in the war production program — There is a great deal of satisfaction in a War Production Unit report: "Without your assistance it could not have been accomplished."

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RYERSON STEEL-SERVICE

Development and Uses of Electric Hoists

By C. A. BOECKER*

THE story of electric hoists is a recent chapter in man's struggle for existence. Prehistoric man and his material handling problems, too, grew out of his need for food and protection against the wild beasts and monsters that then roamed the earth.

Prehistoric man was occasionally the hunter, more often, perhaps, the hunted. When he was fortunate enough, in either capacity, to acquire a carcass, he lacked trucks or hoists to lift or transport his kill.

So, prehistoric man solved his material handling problem very simply; he moved to a cave that was near his kill and salvaged as much as he could with the strength of his hands and his back.

As time passed, man learned to handle materials more readily, altho how he did it is not clear. Noah built the ark without ways or way cranes. Ways were probably not necessary because the flood waters gradually floated the ark. But how Noah lifted the huge beams in place to build the ark is a mystery. He had a material handling problem and solved it by means unknown to us.

Later the Pharoahs built the pyramids, which today are one of the world's wonders. We believe that knowledge of the lever and fulcrum plus enormous slave labor helped in constructing the pyramids.

When man conceived the wheel, he eased his material handling problems to a great extent. The wheel led to the pulley. Man could then raise and lower his materials as well as transport them along the ground.

Many centuries came and went before the development of the steam engine. But this development meant that at last, man was free of his dependence on human or animal labor. His discovery made him aware of speed and economy; drove him to seek newer and better ways of handling material.

Then electric motors became available, and our forefathers attached motors to their hand operated chain blocks so they could raise and lower loads by that new wonder called "electricity."

This crude adaptation led to hoists that were actually designed and constructed for using electric motors and it is with these highly efficient modern material handling units that we are now concerned.

It is well to remember that we are engaged in an all-out war, threatening our way of life.

With this thought in mind, it is necessary for all manufacturers to review their material handling methods. Of what use is the finest machine tool,

*Hoist Engineer, American Engineering Co., Philadelphia.

if adequate material handling equipment is not available to serve that tool to the Nation's best advantage?

Any shop producing equipment vital to our defense and offense may have enough strong backs available to "horse" raw material of any size onto a machine and to remove that material from the machine and carry it to the next operation. The questions are:—should the material be handled in that manner and is there time for such inefficiency?

Only 3 or 4 men may have to be called from their immediate jobs for a few minutes to participate in this material handling operation, but how many times a day, a month and a year are these men repeating this dangerous and wasteful operation? Dangerous because all heavy lifting operations expose the men to internal injuries; wasteful because machines must be shut down while the men are away from them or because hard labor is needed for more valuable work.

Electric monorail hoists are built in capacities of ¼ ton to 15 tons with these types of suspension:

(1) Bolt suspension
(2) Floor mounted
(3) Plain trolley
(4) Hand geared trolley
(5) Motor driven trolley
(6) Motor driven trolley **With Open Type Trailer Gage**
(7) Motor driven trolley **With Enclosed Type Trailer Gage**

Bolt Suspension Hoists

Fig. 1 shows a bolt suspension hoist. This type of hoist has no trolley but is equipped with brackets thru which suspension bolts pass.

Bolt suspension hoists are used in these ways:

(a) Bolted permanently to some building member when a load is to be raised and lowered at one spot only.

(b) Bolted to a special trolley for operation upon other than American Standard I-beams, or American Standard I-beams beyond range of standard trolley type hoists.

(c) Bolted to the trolley of a double girder crane.

Where conditions permit, bolt suspension hoists can be used to lift and lower dumb-waiters or freight elevators. The hoist installation is simple. A standard hoist is simply bolted in position at top of the hatchway so its hook will raise and lower vertically in the center of the hatchway. The hoist hook is attached to roof of the cage.

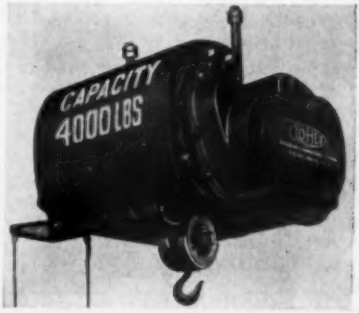

Fig. 1—Bolt suspension type hoist, which may be bolted to a special trolley, to a building member or to a machine.

Electric controls for these hoists are numerous and varied, especially when three or more floors are to be served. It is desirable to be able to call or dispatch the cage from any floor, yet eliminate the possibility of one operator moving the cage when some other operator is working in it. It is also desirable to have the control system arranged so the cage cannot be moved unless all hatchway doors are closed tightly.

The controls must be designed to perform the desired operating functions safely.

Push button control is usually used

IT LOST A WAR!

"For the want of a nail . . ." the shoe, horse, rider, battle—and, consequently, *the whole war*—were lost. So goes the old legend whose moral points to the importance of little things in the achievement of big things.

It takes DETAILS—millions!—to arm a war-winning nation. Every industry has them. Where filing operations are concerned there's almost no end to them. PROPER USE, PROPER CARE and PROPER SELECTION of files have a vital bearing on:

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Saving materials (including file steel);
Increasing workers' efficiency and reducing work spoilage.

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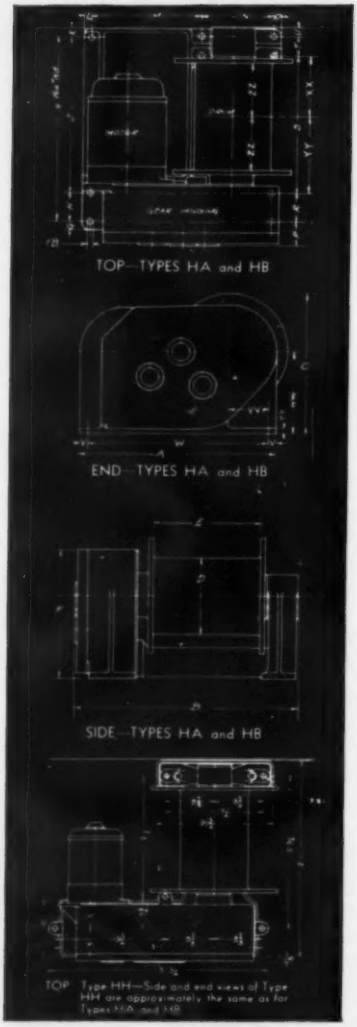
TOP—TYPES HA and HB
END—TYPES HA and HB
SIDE—TYPES HA and HB
TOP Type HH—Side and end views of Type HH are approximately the same as for Types HA and HB

Fig. 2—Arrangement drawings of one type of floor mounted hoist. This one has feet for convenience in fastening in any required position or location.

on installations of this nature because it lends itself more readily to the required performance.

There are many instances in which a long trough must be raised from the floor to a certain height, then tilted so the contents will flow from the trough into a bin or vat. To accomplish this, 2 bolt suspension hoists are used. Each hoist is controlled individually. While 2 separate hoisting units, built to the same specifications, will not raise and lower their hooks at exactly the same speed, the operator can make them do if the hoists are controlled separately.

The hook of one hoist is attached to the front end of the trough and the other hoist hook is attached to the rear of the trough. The operator starts both hoists at once and raises the trough on an even keel to its highest level position. When the trough reaches its highest level position, the front hoist is stopped while the rear hoist continues to raise the rear of the trough until it reaches the proper dumping position.

When the trough is emptied of its contents, the rear hoist lowers the rear of the trough until the trough is on an even keel and then both hoists lower the trough to the ground.

If height of lift is small, so that the difference in speeds between the hoists is negligible, it is possible to make the raising and tilting of the trough automatic by using push button control with maintaining contact for hoisting and adjustable upper limit switches. The upper limit switch on the front hoist is set automatically to halt upward travel of the hook block when the trough reaches its highest level position. The upper limit switch on the rear hoist is set to stop the upward travel of the hook block when the trough is in its dumping position.

With this arrangement, after the trough is loaded on the floor, the op-

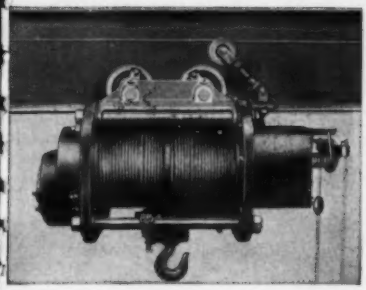

Fig. 3—Plain trolley hoist, drum side view with cover removed to show cable; mounted on standard I-beam; note current collectors.

erator can momentarily depress one hoisting button (both motors being controlled from one hoisting button, but from individual lowering buttons), and then be free to perform some other work. The operator depresses the hoisting button, both hoists raise the trough. When the trough reaches its highest level position, the front hoist automatically stops and the rear hoist continues to operate until the trough is in its dumping position. The rear hoist stops automatically. When the trough is empty, the operator lowers the trough as previously explained.

Many bolt suspension hoists are attached to machines by the manufacturers. The hoists thus become integral parts of the machines. The hoists serve as the lifting and lowering medium necessary for the machines' complete performance.

In view of the fact that standard plain trolley hoists are designed for operation upon the lower flange of American Standard I-beams and that some plants have monorail systems composed of special track sections, it is often necessary to attach a special trolley to a standard bolt suspension hoist so the hoist can be used on an existing monorail. This can be done readily, provided the trolley is designed properly for attaching to the suspension bolt holes of the bolt suspension hoist.

Fig. 13 shows standard bolt suspension hoists with special trolleys for operation upon special monorail in a heat treating room.

Many double girder cranes use standard bolt suspension hoists as their lifting media. If the crane has a bridge trolley, the hoist is attached to that trolley. If the crane has no bridge trolley, the hoist is attached to a supporting structure between the bridge girders.

Local operating conditions determine how each hoist is controlled. Some bridge cranes have an operator's cage attached to them. In this circumstance, the hoist control is removed from the hoist and installed in the crane cab so the hoist can be operated remotely. Other conditions require grouping controls for the hoist motor, the trolley motor, and the bridge motor all at one point in close proximity to the hoist hook. To meet this requirement, the hoist should have standard floor operated control and the trolley and bridge motor controls must be mounted on the hoist for remote control of the trolley and bridge motors.

Floor Mounted Hoists

A floor mounted hoist is a standard hoisting unit equipped with feet which make the hoist suitable for base mount-

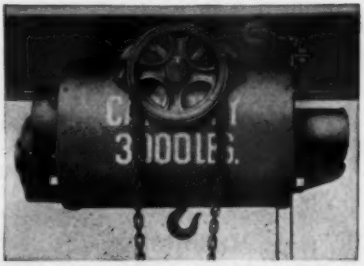

Fig. 4—Side view of hand-geared hoist. Teeth cut in trolley wheel flanges mesh with a gear keyed to chain wheel. This type is generally used for accurate spotting of heavy loads.

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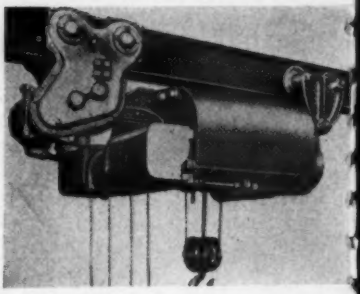

Fig. 5—Motor driven trolley hoist. Trolley is driven by a separate motor, operated from controls depending from hoist.

ing. Ultimate use determines internal construction. Some installations require a unit which has all the features of a standard bolt suspension hoist plus the mounting feet. In these cases a standard bolt suspension hoist is actually used and the mounting feet are added to it.

Other installations do not require standard hoist features such as holding brakes, lowering brakes, hook block and automatic upper limit switch. When these features are not needed they are eliminated.

Usually the external appearance of a floor mounted hoist is that of a standard bolt suspension hoist to which mounting feet have been added.

Fig. 18 shows a hoist with feet so that it can be bolted to the floor.

Hoists arranged in this manner have a variety of uses. They are often employed with single line reeving instead of the usual multi-part hoist reeving. When single line reeving is used, the hoist capacity is reduced in relation to the number of parts of cable reeving that have been omitted.

Single line floor mounted hoists can be used to move railroad cars efficiently. Instead of several men slowly and laboriously inching a car along a track with pinch bars, a floor mount-

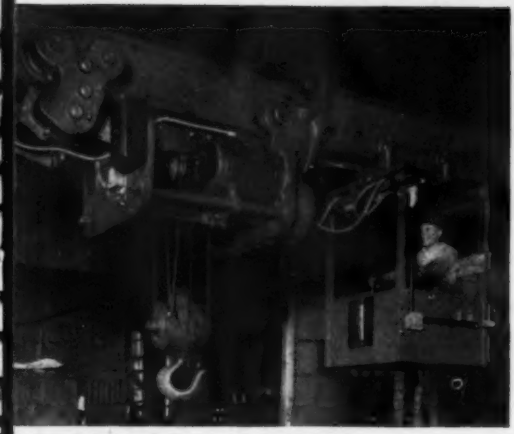

Fig. 6—Motor driven trolley hoist, with open cab for fast, exceptionally long hauls indoors.

l hoist designed and located properly n be used to spot the car quickly, sily, and accurately.

The usual car puller installation consts of a floor mounted hoist located me distance beyond the car loading unloading platform. Outdoors, the ist is equipped with weatherproof otor and control.

A yard engine shifts several cars on e siding, the first car being placed the work platform. The yard enne is then dismissed and not brought ck until all the cars are ready to be spatched from the plant.

When the first car is emptied or aded, the cable from the floor mounted hoist is attached to the front end of the car. As the hoist reeves in its cable, the entire string of cars is shifted along the track. The cars are moved until the second car is opposite the work platform. This process is repeated until all the cars have been emptied or loaded. Then they can be picked up by a yard engine and hauled away from the siding.

Thus the floor mounted hoist eliminates expense and possible delay in using a yard engine to shift cars on a factory siding.

In some cases, the cars placed on a siding by the yard engine are uncoupled from each other and the hoist

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STRATFORD, CONNECTICUT

is used to shift one car at a time. This method permits the use of a light capacity hoist.

Large furnace doors can be raised and lowered easily and quickly by floor mounted hoists. Usually the doors are counterweighted and the single line from the hoist drum is led over a head sheave and dropped down to a direct connection on the door. This installation assures high speed opening and closing of the furnace door.

There are installations where the single line from the hoist drum is multiple-reeved thru stationary sheaves and fastened to the furnace door. This increases the lifting capacity of the hoist and lowers the door speed in relation to the number of parts of cable reeving.

Single line floor mounted hoists are also used in skip-hoist installations. The hoist is mounted in 2 ways; either on the floor with its cable led over sheaves until it can be attached properly to the skip car, or on a ceiling platform with the drum cable led over sheaves to the car.

Pulling kiln cars into or out of kilns is accomplished easily with a single line, floor mounted hoist. Installations of this type require properly located head sheaves so that the cable from the hoist drum can be led over one sheave or set of sheaves to pull the car into the kiln and led over another

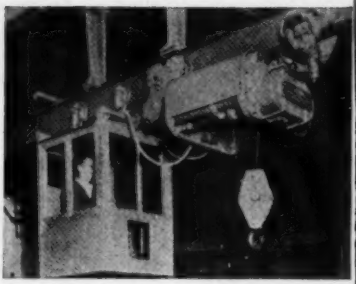


Fig. 7—Motor driven trolley hoist with closed cab for very long, fast hauls, all or part of which must be made outdoors.

or set of sheaves to pull the car out of the kiln.

Sometimes it is desired to move a plain trolley hoist along an inclined monorail. It can be done readily with a floor mounted hoist. The hoist is located at the high end of the monorail and its cable is attached to the plain trolley hoist. The trolley hoist runs down the monorail by gravity as the floor mounted hoist pays out its cable The trolley hoist is pulled up the grade when the floor mounted hoist reeves in its cable.

Floor mounted hoists can also be used to move plain trolley hoists along level monorails. To do it, 2 cables are led off the floor mounted hoist drum. One cable is attached to the front of

Fig. 8—Shop interior showing a number of 2-ton (4-wheel) plain trolley hoists, operating on electrified jib cranes. Power is delivered to hoists thru flexible conductor cords, from automatic take-up reels. Installation is in a large railroad shop and hoists are used to load and unload machine tools.

SHARPENING

A sharp cutter will cut faster with less power and wear. It will produce more accurate work with better finish.

1. Use a soft wheel with medium grain. Keep wheel clean as a glazed wheel may crack cutter teeth.

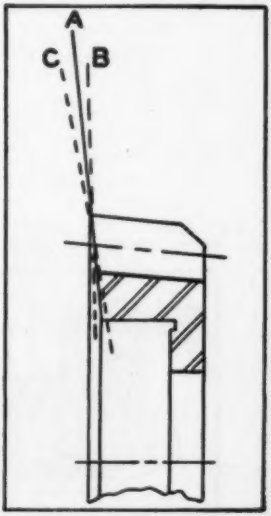
2. Grinding too much metal at a time may cause heat-checks in the cutter teeth.

3. Never grind a cutter except on its face. "Touching up" sides or ends will alter the tooth form and spoil the cutter.

4. Be sure the cutting face is true with the bore. If not, cutting action will be irregular and tooth form changed.

5. Always grind to the correct face angle ("A" in drawing) as marked on the cutter.

If the angle is decreased ("B") the pressure angle will be changed and cutting efficiency decreased. If the angle is increased ("C") the cutting efficiency may be increased but the pressure angle will be incorrect.



CORRECT SET-UP

ccuracy of a shaper cutter is no · than the accuracy with which ıounted in the machine.

sure there is no play between r cutter and arbor.

eck concentricity with an indi- graduated to ten-thousandths. num runout should not exceed '.

runout exceeds 0.0005 in., un- and rotate the spacing collar— collars usually having slight in parallelism.

lix errors in tooth surfaces may : to wear in ways guiding the e in the helical path.

ıen clamping the cutter in ın, use the minimum number cing collars possible.

Additional helpful information is available in a booklet on gear shaping and shaper cutters. Ask for Bulletin GS-42.

CHECKING

Gear checking equipment should be such as to disclose the *exact nature* of the inaccuracy producing unsatisfactory gears.

1. Incorrect pitch diameter usually means machine-setting error or heat-treat distortion. Check with pins or balls.

2. Variable backlash is usually due to eccentricity. Use a master gear in preference to an indicator, if possible. Also check cutters and their mounting for eccentricity.

3. Tooth form and spacing should be checked together, since the former is not dependent on depth at which measurement is taken.

4. Check the spiral lead rather than the helix angle, since the former is not dependent on depth at which measurement is taken.

5. Get a copy of "Better Gears" from Michigan Tool Company for detailed information on locating gear troubles.

For gear checking use Michigan "Sine-Line" Lead Checker (Bulletin No. 1205) and Involute and Tooth Spacing Checker (Bulletin No. 1124)

MICHIGAN TOOL COMPANY

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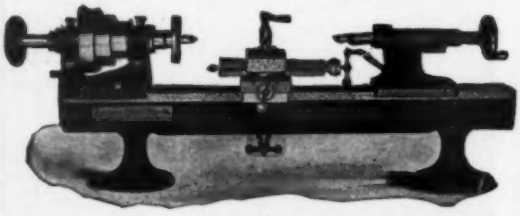
Fig. 9—A 2-ton (4-wheel) hand geared trolley hoist used in an outdoor dipping operation. Engine parts are picked up inside machine shop and carried to dipping tank by the hoist, afterwards being carried back into shop and transferred to a bridge crane for further despatch.

the plain trolley hoist and the other cable is attached to the rear. The cables are so arranged on the drum that when one cable is reeved onto the drum, the other cable is laid off the drum. The reverse takes place when the hoist drum rotation is changed.

By reeving the two cables over properly located head sheaves, the plain trolley hoist will move along the monorail whenever the floor mounted hoist is operated.

Under low headroom conditions, some special double girder cranes use a floor mounted hoist set on top o the crane trolley. These hoists ar reeved and equipped as standard hoist ing units and include lowering brak in the gear train, holding brake o motor, automatic upper limit switch multiple part reeving and hook block This crane and hoist combination permits the hook block to be raised between the crane girders.

Single line floor mounted hoists ar used to lower motor trucks safely dow a steep ramp in one factory. The hois is mounted out of the way on the to floor of the ramp and its cable is at



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Manufacturers of: Base and Saddle Type Universal Turret Lathes · Fay Automatic Lathes · Automatic Thread Grinders · Optical Comparators · Automatic Opening Threading Dies and Chasers.

Fig. 10—A 3-ton, (8-wheel) motor driven trolley hoist with enclosed trailer cage. It is used to load or unload barges tied up at wharf warehouse. Monorail system is constructed so the hoist may enter either door of the warehouse. One hoist therefore serves the entire warehouse.

tached to the rear of the truck.

These hoists are equipped with lowering brakes and holding brakes so the descending speed of the truck will always be constant and under control.

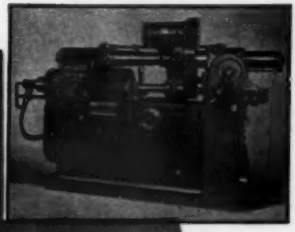
Plain Trolley Hoists

Fig. 3 shows a plain trolley hoist with a built-in type trolley. If you handle loads up to and including 2 tons infrequently and have to transport them short distances along unobstructed floor paths, this is the type of hoist to use. The hoist is moved along the rail by pulling a tow rope or pushing the load.

The trolleys are designed so the wheels can be spaced for operation upon the lower flange of one beam within a range of sizes of American Standard I-beams. The I-beam sizes allowable vary for different classes of hoists.

When the monorail system is electrified, plain trolley hoists are equipped

Fig. 11 — Motor assembly shop view showing several 1½ ton (4-wheel) plain trolley hoists on bridge beams of several single girder cranes. The bridge beams are electrified and power is delivered to the hoists thru current collectors.



Bryant 16-C-16 Internal Grinder

MONEY IN THE BANK

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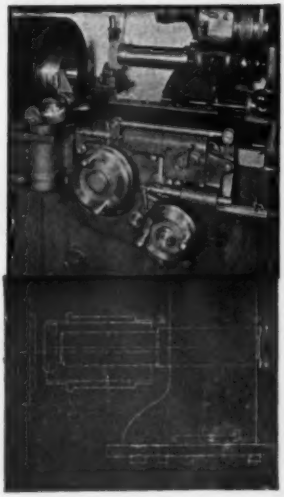

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with current collectors as shown in the illustration.

Current collectors may be wheels for use with flat bar or wire conductors, or shoes for use with T bar or angle iron conductors. The current conductors should be located in accordance with the hoist manufacturer's recommendations.

If the monorail system is not electrified, current collectors are omitted and replaced by a flexible conductor cable. Conductor cables can be arranged in several different ways, depending upon actual operating conditions, to deliver power to the hoist and yet not festoon from the beam when the hoist is at different points along the monorail.

While plain trolley hoists are usually moved by pulling a tow cord, or by pushing the load, they are sometimes combined with a telpher system. In a system of this kind, the track must be straight. A sprocket is attached to each end of the beam. An endless chain passes around the two sprockets parallel to the monorail. The chain is attached to each end of the hoist. One of the sprockets is caused to revolve either manually or electrically. When the driven sprockets rotates, it causes the chain to travel and move the hoist.

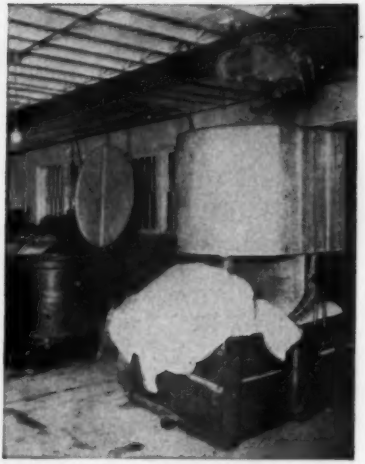

Fig. 12—Note the low headroom condition in this laundry installation. A 1-ton (4-wheel) plain trolley hoist handles the extractor.

This last adaptation makes a plain trolley hoist comparable in operation and usefulness to a motor driven trolley hoist (shown in Fig. 5.). However, in order to centralize the controls, it is necessary either to place the hoist control remote from the hoist at a

Fig. 13—Several 1-ton bolt-suspension hoists are shown, equipped with special 8-wheel plain type trolleys for operation on a special track. These hoists are used for loading and unloading heat treating furnaces and transporting the treated parts to dipping tanks.

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BULLETIN 38-42—Flexible Shafts for Remote Control.
BULLETIN 1238 —Flexible Shafts for Power Drives.
BULLETIN 641 —How to Make the Most of Flexible Shafts.
BULLETIN 741 —Choice and Application of Flexible Shafts in Aircraft.

IF YOU NEED ENGINEERING AID in selecting the proper flexible shaft for a particular power drive or remote control job and in working out application details, our engineers are ready to give you their recommendations based on years of practical experience in applying flexible shafts to a wide variety of uses in aircraft, motor vehicles, machine tools, radio and electronic equipment, etc. At present, of course, this aid must be confined to jobs connected with war work.

IF YOU NEED SAMPLE SHAFTS for experimental purposes we'll supply them if you will let us have the requirements of the job for which they are intended so we will know what type and size of shaft to send you.

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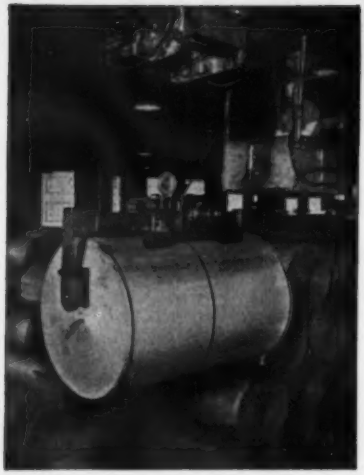

Fig. 14—A 3-ton (8-wheel) motor driven trolley hoist with open trailer cage. The hook block does not have the usual hook, but instead is fastened directly to a motor driven roll grab by means of a special pin. Power for the roll grab motor is supplied thru a flexible conductor cable, attached to an automatic take-up reel mounted on the hoist. Controller for roll grab motor is located in hoist cage, giving operator complete control of all motors of the unit.

point adjacent to the telpher operating mechanism, or place the telpher control on the hoist.

The first combination is the only one that can be used if the telpher is operated manually, while either combination can be used if the telpher system is operated electrically. Both combinations require additional conductor bars for the motor controlled remotely.

If the floor paths are clear and it is desired to have the operator near the load whenever the hoist is in use, then the telpher system should be operated electrically and controlled remotely.

Hand Geared Trolley Hoists

Fig. 4 shows a hand geared trolley hoist with built-in trolley. This hoist is used for handling loads ranging from 3 tons to 13 tons, moved occasionally for short distances along clear floor paths, or to spot loads.

The trolley is designed so the trolley wheels can be adjusted in the same manner as a plain trolley hoist. A pinion on the hand gear wheel shaft meshes with gear teeth cut in the flanges of 2 trolley wheels. Pulling on the endless hand chain causes the pinion to rotate, and propel the hoist along the monorail.

These hoists can be equipped with current collectors as shown in the il-

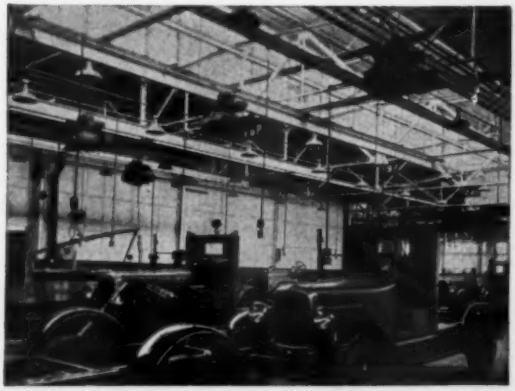

Fig. 15 — Several 1-ton (4-wheel) motor driven trolley hoists with floor operated push button control for both motors. These hoists are used in truck assembly.

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Both vertical and cross movements are provided by means of an "Acme" thread in a bronze nut of liberal size. Both are fitted with graduated dials reading in thousandths of an inch. Sturdy, rigid of design it insures a freedom from vibration and guarantees the ability to produce accurately ground tools.

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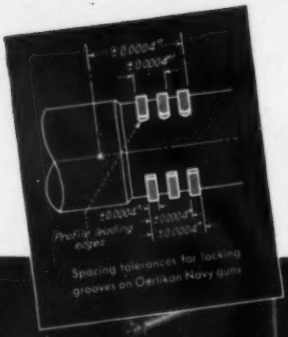

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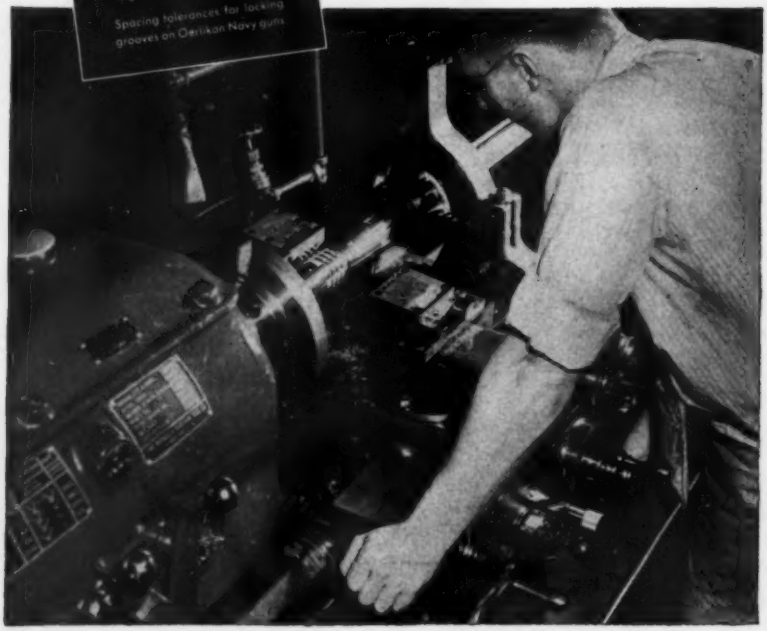

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Two interchangeable barrels are required for each Navy Oerlikon gun being built by a large automotive manufacturer. To lock properly in the breech casing, each barrel has three interlocking grooves, which must be turned to accuracy limits of 0.0008". Actually, the work is produced within 0.0004".

Steps in the operation consist of:

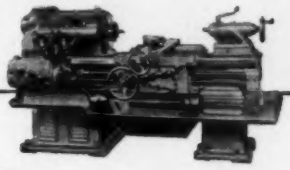
1. Milling interruptions before grooving to prevent heavy burr being thrown up between grooves. Also, since grooving chips are no longer than the length of the groove, they cannot carry around with the work.
2. Turning grooves on a Monarch 16" x 78" Model W Lathe. This is equipped with a special cross slide which mounts front and rear tool blocks and feeds to positive stops. Tools are fitted tightly into blocks, with hardened spacers to maintain accuracy.

Tools are purchased 0.001" oversize for width and are lapped to half a tenth in the plant toolroom, with extreme care to maintain size and clearance angles, with keen edges free from minute nicks. Tool setting is checked with master gage to a 0.0002" limit for spacing and cumulative errors.

After tool blocks and positive stops are set, the work becomes almost completely automatic on this type of Monarch Lathe. This is the same basic design which is used extensively in the automobile industry for piston grooving, and that has proved its worth for so many years in its accuracy and unfailing performance.

Again, we point out that regardless of increase in the production of Monarch Lathes for war implement use, we tolerate no letdown in the quality which has earned Monarch's reputation.

Whether the job requires power, speed, accuracy or stability, Monarch Lathes are producing for OFFENSE.



MONARCH LATHES

COVER THE TURNING FIELD

lustration or with flexible conductor cable.

When extremely wide loads are to be moved comparatively short distances, it is necessary to locate the hand chain of a hand geared hoist so the chain will clear the load. If the hand chain wheel is extended beyond its usual location on a standard hoist, there is a tendency for the hoist to tip on the beam whenever the operator pulls on the chain. This tendency increases as the hand wheel is moved farther away from its standard location. As tipping of a hoist on the rail is objectionable and dangerous, some means for preventing tipping must be provided.

Motor Driven Trolley Hoists

Fig. 5 shows a motor driven trolley hoist (8-wheel). These hoists are used to handle loads speedily and frequently for long distances and over obstructed floor paths. The trolley shown has two 4 wheel trucks. One truck (called the plain trolley) has 4 plain wheels. The other truck (called the driven or motor truck) has 4 plain wheels also, but these wheels are keyed to their axles and all 4 axles are driven by an electric motor thru a train of spur gears. All trolley gears are totally

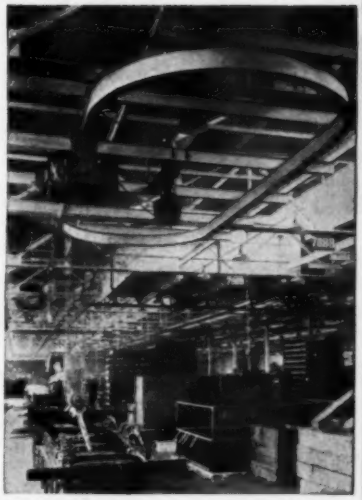


Fig. 16—A 2-ton (8-wheel) motor driven trolley hoist, operating on a loop track in an automobile assembly plant. This hoist raises sub-assemblies from floor below, thru the railed hatchway, placing them on the second floor conveyor line.

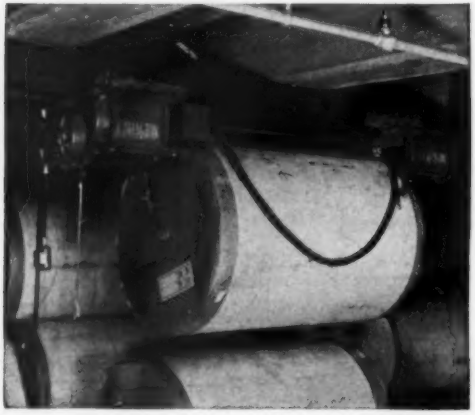


Fig. 17—Special adaptation of two (4-wheel) plain trolley hoists connected in tandem to handle rolls of paper under extremely low headroom conditions. The picture does not show the roll in its uppermost position.

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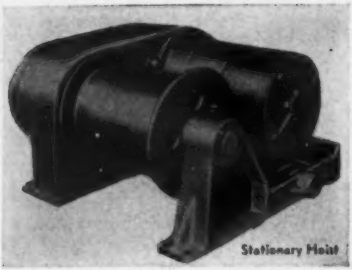

Fig. 18—Floor mounted hoist with feet for bolting in any suitable location or position.

enclosed, and mounted on short shafts equipped with ball bearings. The gears operate in an oil bath.

Fig. 6 shows an 8-wheel motor driven trolley hoist with an open type trailer cage. This combination is made up of a motor trolley hoist similar to that shown in Fig. 5 which is attached an open cage for the operator. Controls for the hoist and trolley motor are located in the cage so the operator has full control of hoist and trolley units.

This hoist is used indoors for fast long-distance handling of loads over obstructed floor paths.

If used in combination with a motor driven crane, the crane controls can be located in the cage to allow operator to control the crane as well as the hoist and trolley from his position.

Fig. 7 shows an 8-wheel motor driven trolley hoist with enclosed trailer cage. This unit is the same as the one shown in Fig. 6 except the cage has been enclosed and the hoist properly protected for use outdoors.

In these days of national emergency, where we are all working against time, all material handling problems should be given careful consideration and electric hoists should be installed whenever they will serve to speed up our war program.

One important point to remember in any hoist application, where time is the essence, is that standard electric monorail hoists can be built and placed into service much more quickly than special hoists. Try always to make use of a standard hoist.

(Illustrations — Courtesy American Engineering Co., Philadelphia, Pa.)

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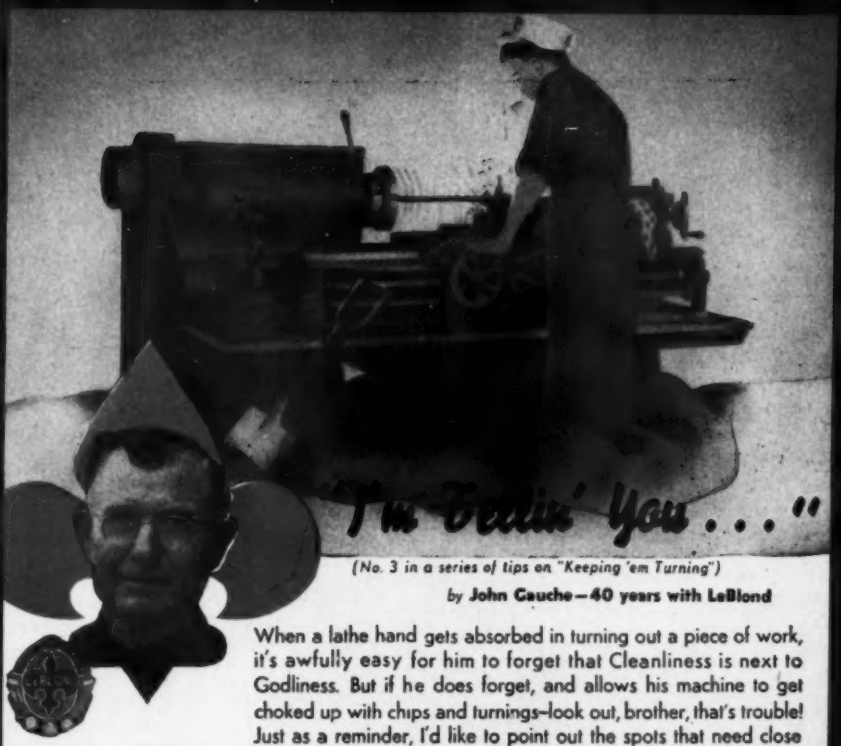

"I'm Tellin' You . . ."

(No. 3 in a series of tips on "Keeping 'em Turning")

by **John Gauche—40 years with LeBlond**

When a lathe hand gets absorbed in turning out a piece of work, it's awfully easy for him to forget that Cleanliness is next to Godliness. But if he does forget, and allows his machine to get choked up with chips and turnings—look out, brother, that's trouble! Just as a reminder, I'd like to point out the spots that need close watching to keep your lathe running accurately and smoothly.

ipers do a good job of keeping ry turnings out from under the ge. But when you work with iron, you should remove the s occasionally and clean them in oo to rinse out the dust and grit.

When you place a tool in the tool post, check to be sure there are no turnings between the collar and the compound rest, or between the wedge and the collar. Your tool can't get a firm rest in a dirty tool post.

Don't move the tailstock along the ways without first carefully wiping off all chips. Turnings on the ways will throw the tailstock out of alignment and ruin your accuracy. Also keep tailstock spindle clean.

Before replacing center, wipe out the hole and clean the tapered part o the center. When using drills, chucks or reamers be sure they are tigh in the taper hole. If there is dir between the two, the part wil revolve and cut the taper hole

HE R. K. LeBLOND MACHINE TOOL COMPANY

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Largest Manufacturer of a Complete Line of Lathes

How to Get MASS PRODUCTION from TOOL ROOM TOOLS

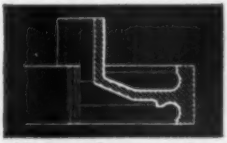
High Speed Production at Tool Room Limits Without Specially Built Machinery

Many of the foremost producers of war goods are faced with the novel necessity of making tool room tools perform at mass production speeds at limits of accuracy previously never expected outside the tool room. They have, through the use of machine tool controls, been able to make ordinary tool room machine tools "do the impossible."

Separate machine tool controls have placed many of the operations on a full automatic basis; the most skilled of their operators have been released for work of greater importance. The elimination of the necessity for increased floor space and excessive long waiting for specially built equipment has been entirely obviated. These machine tool controls, DUPLIMATICS, manufactured by the Detroit Universal Duplicator Company, are now being used throughout the country on war goods production exclusively. The type of work that can be handled is described as follows.

AUTOMATIC CONTOUR TURNING

This sketch shows a thin section propeller gear housing which was of too intricate contour to be machined by manual operation, too thin to be done with forming tools. Also, too few a number were required too fast to permit the designing and building of equipment for this one operation alone.



A "DUAL" DUPLIMATIC was connected with the cross and longitudinal feeds of a standard Reed-Prentice lathe. Both feed screws are turned automatically and simultaneously as required to feed the cutting tool in and out.

The work is chucked in the usual manner. A template of the exact size and outline of the finished work is fastened to the cross feed carriage. A tracer, clamped to the lathe bed, is adjusted so that its stylus can contact the template. The moment the operator starts the lathe and touches the starting button on the control panel of the DUPLIMATIC, the latter "takes over" entirely on a full automatic basis—moving

the cutting tool automatically along the exact path of the finished work.

Since the operation is entirely automatic and since the feed on both screws is simultaneous and graduated in extremely fine increments, blending of radii is certain and even the straight portions of the work are of such fine finish that very little hand-finishing is required. DUPLIMATICS have shown an increase of 7 times the production possible with manual control. Moreover, a decided decrease in hand-finishing and scrapped parts has resulted.

AUTOMATIC CONTOUR MILLING

Milling the contour of aircraft connecting rod cavities is now being done on standard vertical milling machines. In this instance, there was no waiting for special equipment, nor any special training required for the operators of the machines. This operation, while requiring the close-finish of tool room die sinking work, has to be done at speeds impossible with manual operation alone.

The "DUAL" DUPLIMATIC, identical with that used for the contour turning mentioned above, turns the longitudinal and cross feed of the milling machine table. (If the depth of cut also had a contour or variation, a "THREE-WAY" DUPLIMATIC instead of the "DUAL" DUPLIMATIC would have been required.) A template is mounted on the table alongside so that it can be contacted by the stylus of the tracer.

This operation is also automatic, excepting that the operator is required to touch one of four "change-of-direction" buttons on a handy control panel when the milling operation is negotiating a corner of the work. Exceptional blending of radii has resulted in reduction of hand-finishing as compared with that required before the "DUAL" DUPLIMATICS were installed.

The DUPLIMATIC equipment used in this work is an entirely separate control mechanism which can be used with almost any machine tool. The advantages of the use of DUPLIMATICS are that no specially built equipment is needed; tool room tools can continue to hold the accuracies for which they were originally designed.

Specially trained operators are not needed. Usually the same operator, with a few hours' instruction, carries on. In some instances, relatively unskilled operators have replaced the old operators—the latter being released to do work requiring their particular skills.

The installation of DUPLIMATIC on a machine tool does not limit that machine to automatic duplicating only. The DUPLIMATIC can be quickly "de-clutched" from the feeds to permit manual operation.

DUPLIMATIC machine tool controls are used in some of the largest mass production shops in America, producing: TORPEDOES—BOMBS—MACHINE GUNS—AIRPLANE ENGINE PARTS—TANK TURRETS—ANTI-AIRCRAFT GUNS—AIRPLANE LANDING WHEELS.

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The job illustrated above typifies the unusual performance of the Milwaukee Rotary Head Milling Machine. The permanent mold (cast iron) for aluminum shown above was produced in 60% less time than it previously required — without models or templets and directly from the blue-print into the metal.

The Milwaukee Rotary Head Milling Machine is without equal in the high speed, accurate, economical production of dies, molds, hobs, as well as the precision machining of many parts. In a single setup, it performs layout, milling, drilling, precision boring and slotting operations—mills circular and angular cuts in both vertical and horizontal planes. *Send for Bulletin 1002 A.*

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The CENTER SCOPE is an optical locating machine shop tool, constructed for use on any machine. Greater accuracy is obtained on the initial setting when used on precision jig borers — precise individual locating rapidly obtained on lathes, milling and boring machines, etc.

The optical beam, or line of sight, is absolutely inflexible and can never be distorted. There is no pressure on the object to be viewed and it is not subject to any mechanical errors.

Production is too vital — metals too essential — to risk the waste of both because of inaccuracies in machining. With the CENTER SCOPE you SEE the exact location of the spindle axis, you can set up and hold tolerances to "within a tenth", you can compensate for spindle run-out —and maintain absolute accuracy for the set-up.

The CENTER SCOPE is a necessary production tool necessary today because you are interested in saving time — tomorrow because you'll be interested in saving costs.

THREE TYPES TO CHOOSE FROM

The variable and rotating Center Scopes are priced at $97.00, with taper shank $125.00. The Special Center Scope sells for $125.00. Edge Block $25.00 additional.

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Milwaukee, Wisconsin

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Subsidiary of Kearney & Trecker Corporation, Milwaukee, Wis.

Better Light - Better Work

By Geo. A. Fairman

SEEING is prerequisite to doing. The necessity for good lighting and for thoro lighting has always been important, but it has never been so essential as it is now. Highly evident on every hand in big modern plants is recognition of this fact, but there are many smaller plants where improvements can and should be made. Often a simple rearrangement of fixtures, use of larger bulbs, proper shading or diffusion of light or even more frequent cleaning of lighting fixtures or bulbs will help materially. Outstanding among efficient plant lighting installations are mercury lighting layouts, as provided by lighting specialists.

One thing recognized more and more is that often there is a distinct difference between enough light and good light at a given point. In Fig. 1 is shown a lighting condition at a lathe which is found too often. A bare lamp has been crudely shaded with a piece of paper to direct most of the light on the workpiece and the lathe tool being set. There is plenty of light right at that point, but the eyes of the worker are subjected to glare, both from the lamp itself, and from the specular reflections thrown back from the surface of the work. Aside from the glare, there is too strong a contrast between the work and the surrounding dark areas. Under such conditions, workers tire without realizing just why. Their eyes are under heavy constant strain.

Fig. 1—This lathe worker is handicapped by glare from the unshielded local lighting, and reflections from the work. There is too great a contrast between the spotlighting of the work and the surrounding dark areas.

Notice the contrast of the good lighting at the turret lathe in Fig. 2, where the light is well diffused. Notice the absence of deep shadows in the background of Fig. 2, whereas the engine lathe in Fig. 1 is only spot-lighted at the chuck, and the background is heavily shadowed. If the operator turns away from his machine a moment, and then back again, his eyes must twice endeavor to adjust themselves to the great difference in the light.

However, it is not meant to give the idea that lights mounted close to the work do not constitute good practice. They most certainly do, but it

Fig. 2—A good example of diffused lighting with ample illumination of the work, a minimum of reflected light and no surrounding dark areas.

depends upon how the light is shaded and how it is diffused and how much general illumination is provided. See the lathe in Fig. 3, and note the outstanding difference between the lighting here and in Fig. 1. Yet the lathe in Fig. 3, you will notice, has a directly mounted lighting unit attached, so shaded that the lamp itself is not in the operator's line of vision, and also perfectly diffused and distributed over the machine. The value of directly mounted lights on machines, when they are of the right kind, can hardly be over-estimated, and one of the strongest proofs of this fact is that there are firms who specialize in building such lights for application to new machines, collaborating with machine builders in their design and application. If you could see a list of highly modern machine tools to which such lights are applied as standard equipment, it would be a revelation. Such lights are usually adjustable, so that the light may be directed exactly to suit a given operator, operation, or operating condition.

With reference to providing light right at the point of operation, where machines have not been fitted with individual fixtures, or where there are other points requiring light only now and then, one of the best methods that has been found is the use of lamps mounted on special extension cords, which reel up up out of the way when not needed. They can be taken in any direction, or, where desired, they can be instantly adjusted to the desired height above a bench or machine, raising them on the same principle as you would a window shade. Such lights have found wide use as auxiliaries in many places.

Fluorescent Lights

Fluorescent lighting units have made quite a place for themselves, and are available in various designs. One of these noted, encloses the lamps in a fluted glass housing that diffuses the light, the bottom of the unit being drop-hinged to allow inspection or replacement of the lamps when necessary. These fixtures may be had for either surface mounting or for suspending. Another firm makes a one-piece reflector for their fluorescent units which can be readily detached by the removal of 2 wing-nuts, for servicing, and this type of unit may be had in models accommodating either 2 or 3

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Light

AND

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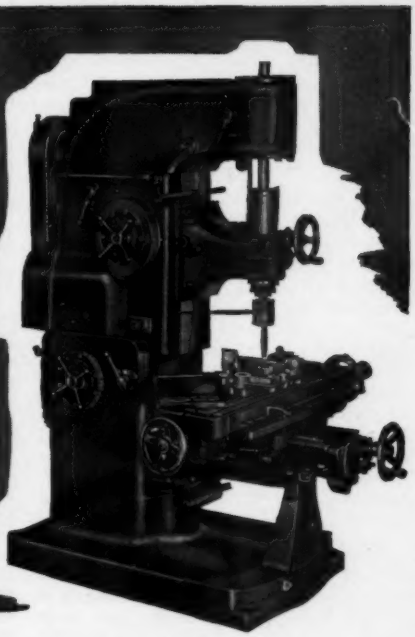

KNIGHT MILLERS, because of their many features, are well adapted for milling and boring operations. These millers incorporate versatility, rigidity, accuracy, speed and power. They are flexible, have a range of speeds and feeds for the efficient use of small tools and cutters as well as large. The swivel and tilting table eliminate the need for many special angle plates, angle cutters, and costly fixtures.

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40-watt lamps. A group of lighting fixture manufacturers produces fluorescent lighting units to certain requirements, which are checked and certified by electrical testing laboratories. One of these, at least, specializes on the production of fixtures which are highly adaptable for the office and drafting room.

Did you know that fluorescent lights in portable models have been made available, which are readily adjustable to any height between 30" and seven feet. Such lights were first used by the Army for servicing planes at night, but have since been widely adopted by industrial plants. They are designed to project light into many otherwise inaccessible places, and are much used in locations where workmen must work in close proximity. Fluorescent light is relatively cool, so far as heat radiated from the lamps is concerned, and this is a big advantage in many cases.

Cold light is something that has long been sought, and tho it has not yet been found in the absolute sense, it is a fact that much progress has been made in reducing the relative amount of heat given off by lighting units. One company makes a high class adjustable light, originally designed for laboratory use, but now used by inspectors to a great extent, which provides a remarkably cool light. Heat produced by the lamp is largely absorbed by a special lens. The light, supported by a convenient pedestal, may be set very close without discomfort from heat. It can be focused directly on the work, and the light beam may be varied anywhere from a spot to a flood, as may suit the particular case. This unit plugs into any ordinary light socket.

Lighting is very important to any student, of course, and what shall we say of students engaged in war production training? One of the many training centers may be seen in part in Fig. 4, and the efficiency of the lighting here speaks for itself. In Fig. 5 is seen an unusually well-lighted plant, where mercury vapor lighting has been installed. The men shown in the foreground here should certainly have no difficulty in reading the print they have in their hands. The firm which specializes in lighting systems of this kind has a broad range of lighting equipment of every kind, and full engineering facilities for

Fig. 3—Compare this example of lathe lighting with Fig. 1. Here, a properly arranged local light gives sufficient illumination for close work and the surrounding area is subjected to uniform general lighting.

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For Accurate
HIGH PRODUCTION ETCHING
Deeply Etches Hardened Parts without Burr

MARKS GOODS IN FINISHED STATE—Most efficient on highly polished or ground surfaces, large or small.

PERMANENTLY ETCHES — LIGHT OR DEEP — from .0001" to .003" deep, and from .0075" to .015" wide, on soft to hard metals, including hardest steels—*Any Shape*, on flat or irregular surfaces — without Forming Guide.

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SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING

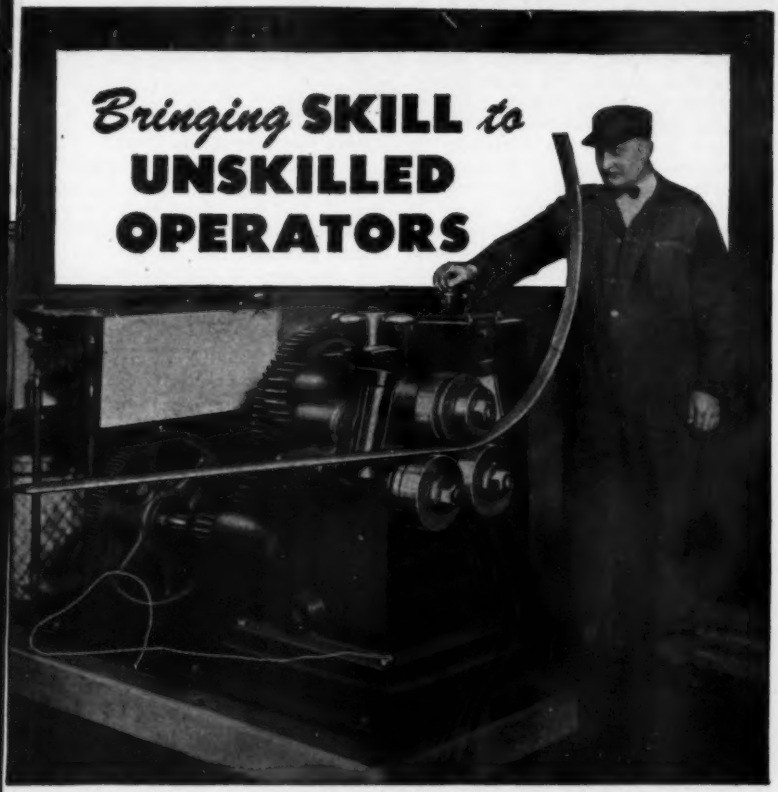
Fig. 4—Note the ample and well distributed lighting of this war production training center. No glare, no harsh lighting and no dim spots.

adapting their equipment to circumstances in any plant.

At present, when subversive activities must be carefully guarded against, the best protection any plant can have under normal conditions is a well-lighted exterior, and more attention is being given to this everywhere. Outdoor lighting fixtures for the illumination of streets, areaways, plant fences, etc., have been made a specialty by some of our large electrical firms. Such fixtures are available in designs for either symmetrical or asymmetrical light distribution, as may be desired. Some firms undertake to engineer floodlighting requirements to particular jobs, and they have sufficient array of equipment to make each layout thoroly suitable. One of these, incidentally, has a hinged floodlight pole, so arranged that the light may be brought right down to the ground for servicing, under full control at all times. There are other firms which make protective lighting fixtures for direct attachment to exterior plant walls, which accommodate 500-watt lamps. These are suited for installation anywhere from 22 to 28 feet above the ground, and at about 150-foot spacing between lamps. Another firm makes a highly competent floodlight which is adapted for mounting on a horizontal surface, a vertical surface, or on 2" pipe, as may be found most convenient. These lights are adjustable to almost any position, are highly resistant to corrosion, and may be had in different wattages and in different light distributions, concentrated, broad, or intermediate.

Carbide floodlights! Did you know these are available and in use. These are portable floodlights, and the chief use is for emergency service. They incorporate carbide generators, and may be had in various sizes, with lighting capacities ranging from 1500 to 16,000 candlepower. To some extent, this type of equipment is used on routine night duty where electric lighting is not readily available. One charging of a unit with water and carbide will keep the 2 lamps of the device burning for 6 hours.

Occasionally, one finds himself in need of some special type of fixtures, or some special arrangement of standard fixtures. There are lighting firms that specialize in fixtures of various kinds, adapted for the use of standard lamps. Occasionally, there is need for vapor-proof lighting fixtures, where explosive atmospheric conditions ob-



● Skill is built right into Buffalo Bending Rolls. That's why—even with unskilled workers—a wide variety of circular forms can be turned out swiftly and accurately with these husky production machines. Buffalo Bending Rolls are constructed for the heaviest bending operations—rings, arcs and spirals with many types of stock—and their ease of operation insures maximum output on a 24-hour-a-day schedule.

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"Buffalo" BENDING ROLLS

tain, as around spraying booths in finishing rooms and like locations.

Regardless of the kind of equipment you have for lighting your plant, it must be very carefully maintained, if you are to realize the maximum in lighting service from it. It is one thing to obtain a higher level of illumination, and it is entirely another thing to maintain that level. The right selection of lamps must be made and followed. There are firms which make every conceivable kind of lamp used in industry. There is an advantage in obtaining lamps from such firms, for it is self-evident they have no interest in getting you to use any other lamps than the ones really best suited to your purpose, for they are in a position to sell you in any case. But lamps and reflectors must be kept clean, and all lighting equipment must be kept in good repair. Dirty lamps have a way of "sneaking up" on one. The light or illumination level lowers so gradually as the lamps gather dirt, that it is hardly noticed. The only answer is the establishment of periodical cleaning times for all lamps in use, and all reflectors.

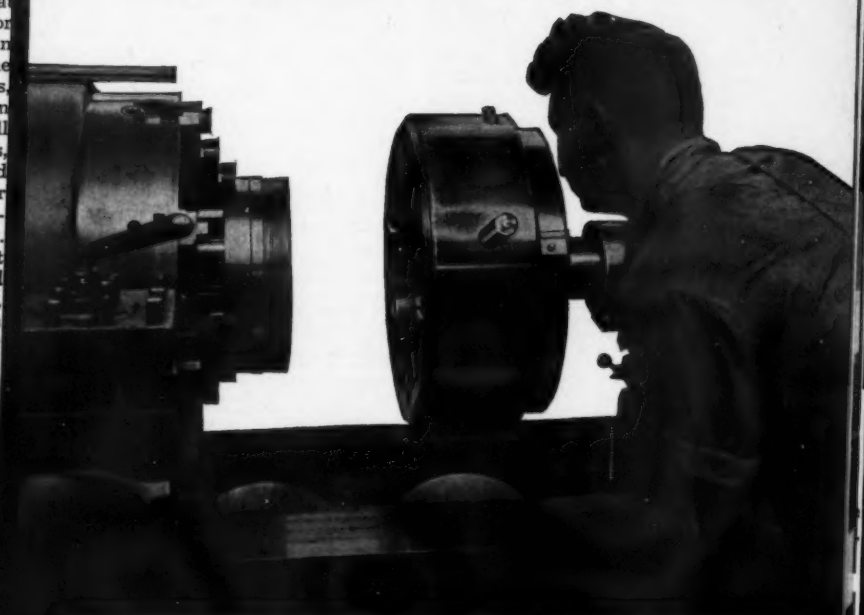
Lights for Very Close Work

It should not be overlooked that lights and lighted units adapted for specific and very close work have been made available and put into use in the metal-working industries. There is, for instance, a lighted magnification unit, devised for inspection, for small parts assembly and similar services, where combined magnification and properly directed light is of particular value. Such units are available in different models for different conditions.

You may be interested to know that where light wave measurement is used to determine flatness of surface areas, and where optical flats are used as comparators, a special monochromatic light is being used considerably, which has a large, bright working field, mak-

Fig. 5—Here is an excellent example of modern shop lighting, with sufficient diffused illumination for easy reading of blueprints.

MODERN SELF-OPENING DIE HEADS



WHATEVER your threading problems are, you will find Modern ready with a practical solution. The special 14" Modern Self-Opening Die Head illustrated has a capacity from 10¾" to 14" and was made for a company who has had one in service for over 12 years and who has just duplicated the order.

Standard Modern Stationary Type Self-Opening Die Heads have a capacity from ⅛" to 7". They are described in Bulletin M-122----send for your copy.

CONSOLIDATED MACHINE TOOL CORPORATION

MODERN TOOL WORKS

DIVISION

ROCHESTER, NEW YORK

ing inspection fast and easy without losing time thru necessity for exact work placement. The same firm making the light, incidentally, is also in position to furnish optical flats for use in connection with it.

Regardless of where and how light is used in or about your plant, give it full consideration to see whether you are using the best equipment for the purpose, and using that equipment in the best manner possible, to realize the greatest value from your lighting dollar. It is just as inconsistent and just as wrong, fundamentally, to use poor lights or poor lighting equipment, as it is to use poor tools or poor equipment of any other kind.

EDITORIAL NOTES—

All five pictures are by courtesy of General Electric Co., Nela Park, Cleveland, Ohio, who are specialists in mercury lighting, have a vast array of lighting equipment, and make every kind of electric lamp available.

Directly mounted lights on machines are extensively furnished by Vimco Mfg. Co., 109 Chenango St., Buffalo, N. Y.

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The extension lights which can be taken in any direction or adjusted to any required height, reeling up out of the way when desired, are made by Appleton Electric Co., 1701-1729 Wellington Ave., Chicago, Ill.

Fluorescent lighting units in fluted glass housings with drop-hinged bottoms as mentioned, are made by Lighting Products Co., Highland Park, Ill.

The firm making fluorescent units with one-piece reflector readily removable by taking off 2 wingnuts, is Mitchell Mfg. Co., Chicago.

The group of manufacturers mentioned as producing fluorescent lighting units to certain specifications, is known as Fleur-O-Lier Manufacturers, Keith Building, Cleveland, Ohio. The one of the group cited as making fixtures especially adaptable for the office and drafting room is The F. W. Wakefield Brass Co., Vermilion, O.

Fluorescent lights in portable models are available from Lumidor Mfg. Co., Los Angeles, Cal.

The adjustable light used for inspection, having heat from the lamp largely absorbed by special lens, and capable of having the light beam varied anywhere between a spot and a flood, is made by Arthur S. LaPine & Co., Chicago, Ill.

The outdoor lighting fixtures mentioned as being suitable for lighting streets, areaways and plant fences are some made by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

One firm which engineers lighting installations as to floodlighting, and has the hinged floodlight poles as mentioned, is Revere Electric Mfg. Co., Chicago.

The firm making protective lighting units for attachment to outside plant walls as mentioned is General Electric Co., Schenectady, N. Y.

The firm making the adjustable floodlight unit which may be mounted either on a horizontal or vertical surface, or on 2" pipe, is Pittsburgh Reflector Co., Pittsburgh, Pa.

The carbide floodlights of portable unit type are made by National Carbide Corp., New York City.

Special lighting fixtures for use with standard lamps, including vapor-proof lighting fixtures when needed, as well as fluorescent and other lighting equipment, all are furnished by Wheeler Reflector Co., Boston, Mass.

The lighted magnification units mentioned as being good for inspection, small parts assembly, etc., are made by Boyer-Campbell Co., 6540 Antoine St., Detroit, Mich. Also Geo. Scherr Co., 122 Lafayette St., New York, N. Y.

The firm making the special monochromatic light unit for use with their optical flats, etc., is Acme Industrial Co., 210 N. Laflin St., Chicago, Ill.

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Accuracy . . . With a Sundstrand Lathe the operator only has to change work pieces and start the automatic cycle. The lathe does the heavy work and maintains uniformly close limits. Usually the operator can run two or more machines.

Service . . . Airplanes, arms, ammunition, engines, ships, tanks, trucks, tractors, transport vehicles — no matter *what* war equipment you make, Sundstrand Automatic Lathes give you important proved and exclusive advantages on any metal-turning in their field. Our Engineered Production Department is at your service for making most effective use of these advantages. Simply send us accurate data on your turning requirements.

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Sundstrand Automatic Lathes run on cycles of rapid approach, feed, quick return of 250" a minute. These are set up quickly and changed over easily by adjusting dogs on a graduated dial, as indicated at right. No cycle-control cams required.

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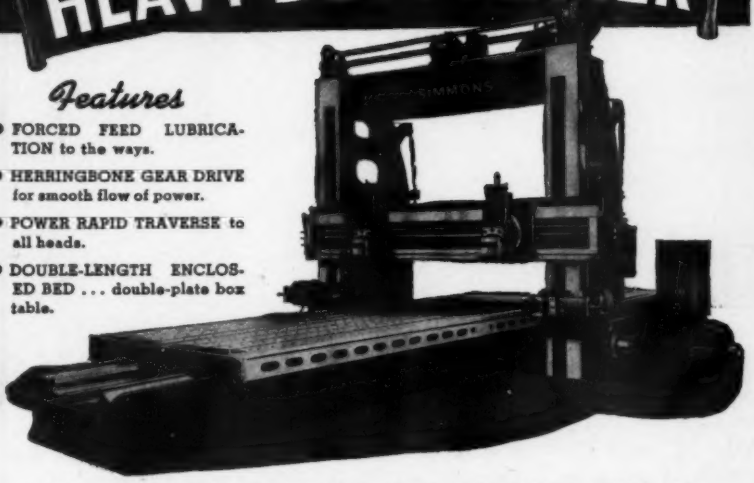

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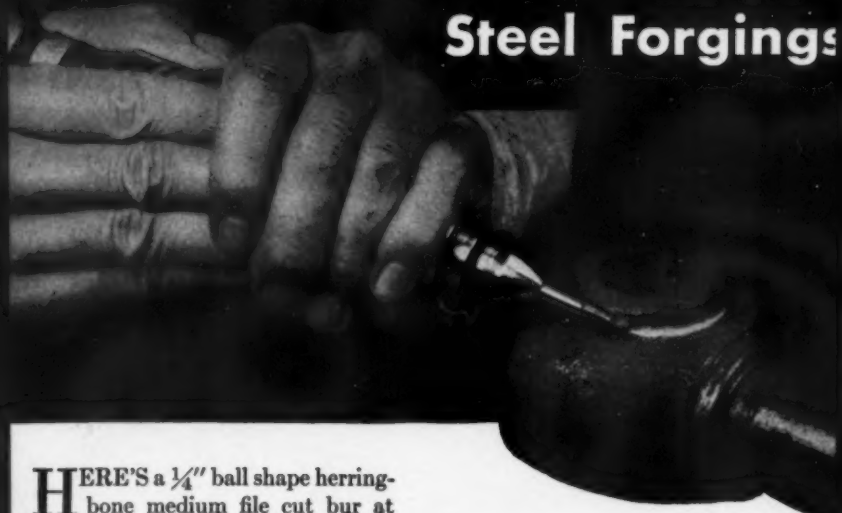

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Why ¼" ball? To *fit the shape* of the work.

Why herringbone? For *control.* On this job a single spiral would tend toward "bur pull." Herringbone cut here balances the opposing "pulls." Operator can guide the bur exactly where he wants it . . . use any pressure he wants. On jobs where "bur pull" doesn't matter, a single right hand spiral works excellently.

Why file cut? For *maximum bur life,* and to *overcome "bur bounce."* A file cut bur bites through the tough skin of a steel forging.

On this type of job, best finish with maximum cutting power is obtained at speeds of 2800 R.P.M., varying with size of bur. After a file cut bur has been broken in, it should be used at slightly higher speeds.

Tip to operators: move the bur at an even rate and pressure. This eliminates the "hills and dales," providing a clean, scratch-free finish.

For burring counsel, resharpening service, and equipment, call on Kellerflex Sales Department.

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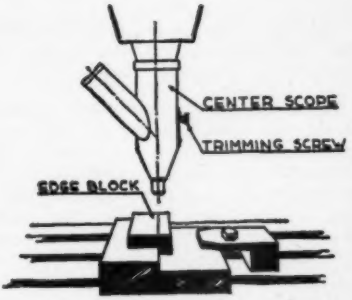
Optical Accuracy in Making Set - ups

By H. A. FROMMELT*

IN the Center Scope, Fig. 1, optics has come out of the tool room and laboratory to take its place in the give-and-take of the production line Simpler, sturdier, more considerate of overtaxed operators' nerves, it goes directly to the job to eliminate the source of error in set-up work. In spite of its ability to magnify 45 times, it is far less delicate than the traditional precision measuring intrument. Its flexible beam of light is not subject to wear, temperature or variation due to pressure on the work. In short, it eliminates the troublesome human factor and prevents errors in set-up before they have an opportunity to make themselves part and parcel of a job.

Its operation is quickly explained and as readily understood. Set in the spindle of a machine, the guide lines of the variable Center Scope can be centered exactly with the machine spindle, reference for this operation being made to Fig. 2. A-B is the centerline of the machine spindle; C-D the center of the Center Scope. An Edge Block formed by bringing together 2 oppositely lapped surfaces (see Fig. 1) provides a reference line at the juncture of the 2 blocks. The Center Scope center is aligned with this reference line on the Edge Block as the first step. Run-out in the chuck, adapter, or even in the spindle, sets up a situation as shown in Fig. 2.



When the Center Scope is revolved thru 180° by revolving the machine spindle, the guide lines (in the Center Scope reticule) will assume position D'. The run-out amounting to D-B' is compensated by trimming the guide lines (by means of the trimming screw —Fig. 1) one-half of D-D' or D-B', the guide lines in the Center Scope will be split by the reference line on the Edge Block now located at B'. Accurate trimming will permit rotating the Center Scope thru 180°, both to the right and the left, with the reference line (Edge Block) splitting the guide lines in the Center Scope. The Center Scope guide lines are now true with the machine spindle A-B. Thus, accuracy

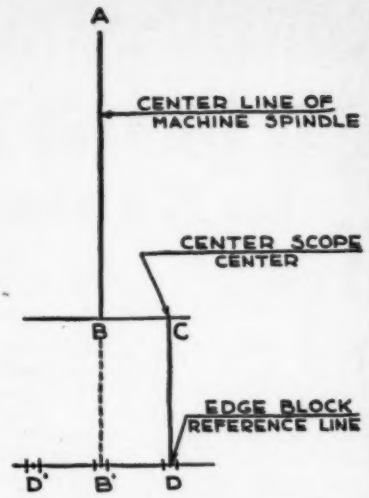
(*Director of Industrial Research, Kearney & Trecker Corp., Milwaukee.)

in the machine set-up as regards spindle, chuck and tool is assured at the outset.

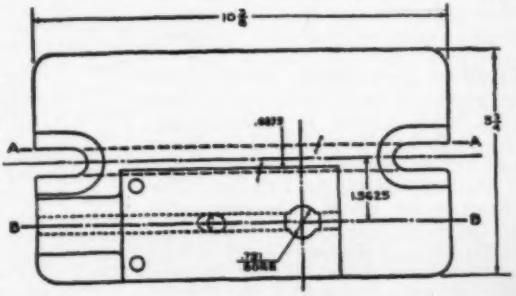
The other type of Center Scope; namely, the rotating, requires no trimming to compensate for run-out. Unlike the variable Center Scope, its rotating shank center line aligns itself with the machine spindle, once the guide lines, spaced 90°, are centered with the object or workpiece layout. The variable Center Scope, generally speaking, is used in vertical spindle machines; the rotating Center Scope, on the other hand, is used on horizontal spindle machines.

The job set-up descriptions that follow will illustrate the applications of the 2 types of Center Scopes.

Holes are to be accurately located in the job shown in Fig. 3, with respect to the keyway. A parallel in line with the keyway edge used as shown in Fig. 4, brings the reference line on the Edge Block in line with A-A. The rotating Center Scope whose ½" shank rotates on specially selected bearings is used to create this set-up. When placed in an adapter, with the spindle running at low speed, the rotating shows the amount of the spindle and adapter run-out. The operator compensates for run-out by adjusting the work until the reference line on the Edge Block splits the instrument guide lines. Thus, the rotating Center Scope permits the operator to perform the trimming operation quickly and easily without revolving the instrument thru 180°.



When trimming has been accomplished (Fig. 4), the center line of the spindle is now in line with A-A (Fig. 3). The milling machine table is now moved vertically a distance equal to A-B. Thus, without benefit of previous lay-out, the holes can be worked



This is Fig. 3, the preceding illustrations being Figures 1 and 2 respectively, which are explained in the text. Drawing at the right shows a typical job in which the holes are to be accurately located with respect to the keyway.

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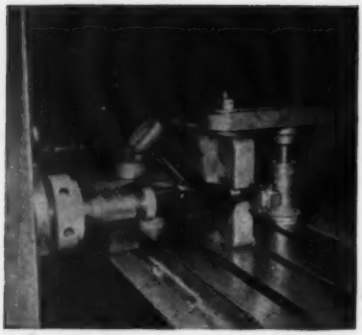

Fig. 4—A parallel in line with the keyway edge used as shown, brings the reference line on the Edge Block in line with A-A (Fig. 3).

accurately with reference to the keyway.

The rotating Center Scope is again used to drill a hole in workpiece (Fig. 5) as shown in the set-up (Fig. 6). Here the layout is previously made on the bronze workpiecee. The spindle of the horizontal milling machine is quickly and accurately aligned with the proposed center on the workpiece.

Again the rotating Center Scope with its spindle slowly revolving, permits

Fig. 6—Set-up for the job shown in Fig. 5, using the revolving Center Scope to set work piece center in exact line with spindle center.

the operator to hold the eye-piece in one position and center its 2 sets of guide lines so that the workpiece center is in line with the spindle center. The operator can now replace the Center Scope with the required drill to complete the job according to specifications.

The necessary lay-out was first made on the job, represented in Fig. 7, which calls for the boring of a hole as shown. The remainder of the set-up is economically executed using a variable Center Scope. In this model, the single guide lines can be shifted as desired with the trimming screw (See Fig. 1) which tilts a pivoted prism. Compensating for run-out in the set-up shown

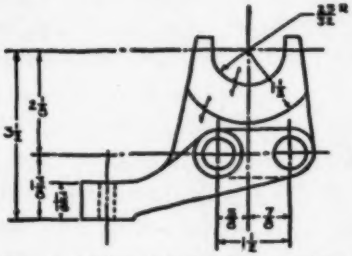

Fig. 5—Another typical job, the set-up for which is shown in Fig. 6.

here (Fig. 8), is quickly accomplished as previously explained. This trimming need not be done using the workpiece itself. The Edge Block conveniently located, permits aligning center of the machine spindle with the Center Scope center.

After such compensating for run-out has been effected, the Center Scope guide lines are then centered with the layout center. Having replaced the optical instrument with the necessary tool, the layout has been completed. The accuracy of such layout is within a .0001" and the time required to complete the set-up is less than ½ that required for any other method or device.

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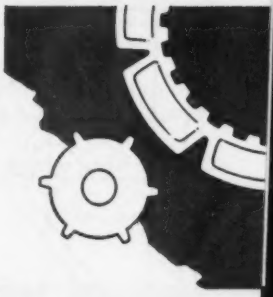

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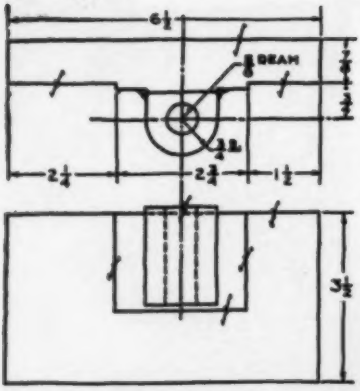

Fig. 7—Another typical job, set-up for which is shown in Fig. 8.

All bores must be accurate from the bottom face of the workpiece shown in Fig. 9. The distance from edge of the workpiece to center of the hole is specified as 3" plus 3.130" plus 1.722" plus 1.949".

The Center Scope permits setting up to bore this hole without previous workpiece layout. The spindle of the vertical milling machine is first aligned with the center line of the Center Scope by the trimming operation previously detailed. The spindle center can now be made to coincide with the back face of the workpiece. The distance being given, the milling machine table can now be moved accurately crosswise (See Fig. 10) using the graduated dials, the required distance. Replacing the Center Scope with the specified boring tool, the workpiece layout and machine set-up are completed and the job can now be carried thru.

An interesting instance of layout and set-up, economically executed and with

Fig. 8—Set-up for the job shown on drawing in Fig. 7, positioning of which is quickly verified by the Center Scope.

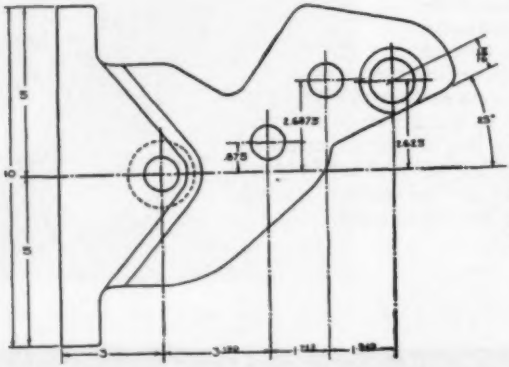

Fig. 9—In this typical job, all bores had to be accurate from the bottom face of the workpiece. The Center Scope permits setting up to bore the hole without previous workpiece layout. Fig. 10 shows the set-up.

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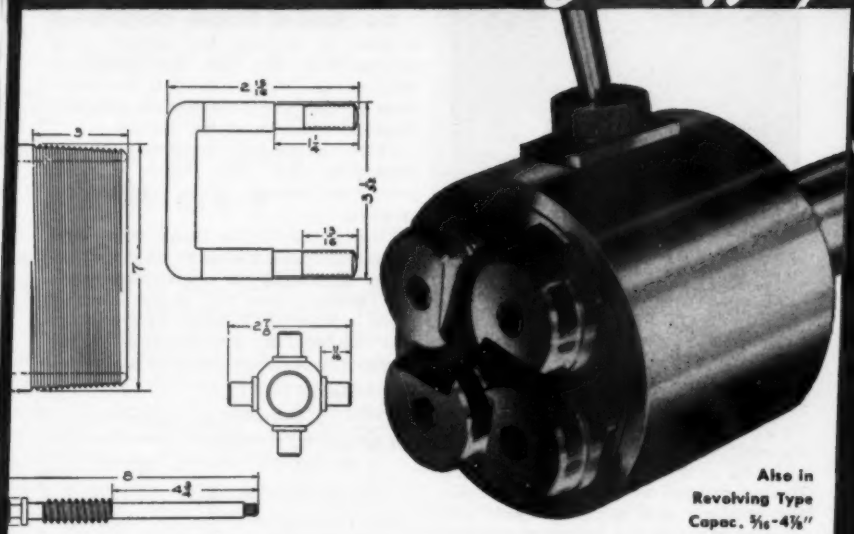

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Fig. 10—Set-up for the job shown on drawing in Fig. 9. Spindle of the vertical milling machine is aligned with center line of the Center Scope. Spindle center can then be made to coincide with back face of workpiece, following through as described in the text.

benefit of far greater accuracy than would otherwise be possible, is shown in Figs. 12 and 13. The circle whose diameter is 39/64" (Fig. 11) is laid out and scribed in the usual manner. Having decided to use a vertical milling machine and a rotary table, the ensuing steps in the layout are necessary:

First—the rotary table plug, (see Fig. 12), is set in the center hole of the rotary table and the table is adjusted until the cross-lines on the plug are centered between the guide lines of the Center Scope.

Next, since the Variable Center Scope is used in making this layout, it is necessary to trim out the spindle or adapter run-out in order that the cross-lines of the plug will remain centered from all positions of the spindle.

Then, the plug is removed and the workpiece (see Fig. 13) is clamped just loose enough to be adjusted by tapping.

Finally, the Center Scope cross-lines are aligned with the those on the workpiece. Replacing the Center Scope with the necessary end mill is the last step prior to moving the table, by graduated dial readings, an amount equal to the radius (½ of 39/64" or .3047") plus the

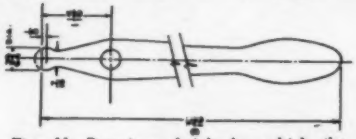

Fig. 11—Drawing of job for which the set-up is shown in Figures 12 and 13.

radius of the end mill. The radius can now be milled according to specifications.

Fig. 12 (left) Using the Center Scope and rotary table plug for positioning the table. Then as shown in Fig. 13. the plug is removed and workpiece set in place as outlined in the text.

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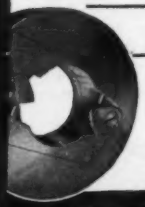

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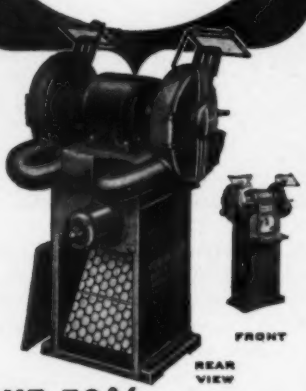

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Save Those Tools

Tool salvage is the subject of a one-reel, black and white, sound picture recently released by International Harvester Co.

In these days of urgent stress on production, with the shortage of high quality materials for tools, it becomes almost mandatory that tools be used to their full capacity.

The picture shows how the Harvester Co's. tool salvage program was organized and its functioning methods, from salvage at individual plants to the central clearing house for the utilization of excess and obsolete tools.

Emphasis is given to the low-temperature brazing process of repairing broken or damaged tools of various kinds.

Regrinding to smaller sizes or reworking to different types are given attention.

Slitting saws, reamers, drills, broaches, hobs, milling cutters, etc., are repaired, ground smaller, or made over to assure valuable tool material giving all possible service.

This picture has been highly indorsed by W.P.B. officials and many organizations appreciating the acuteness of the tool problem. Workmen should profit from seeing the picture. Prints are available in 35 or 16mm sizes, with no charge other than transportation, upon requests to International Harvester Co., 180 North Michigan Ave., Chicago.

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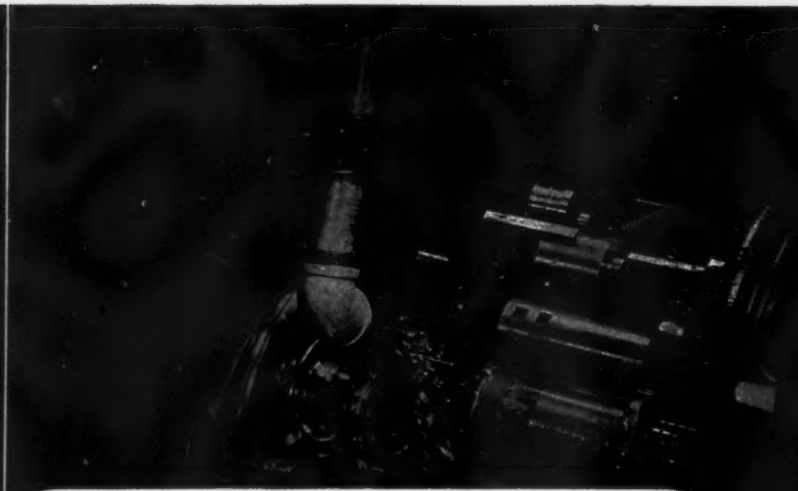

SUNICUT helps shell plant run complete 8-hour shifts without tool change or regrind

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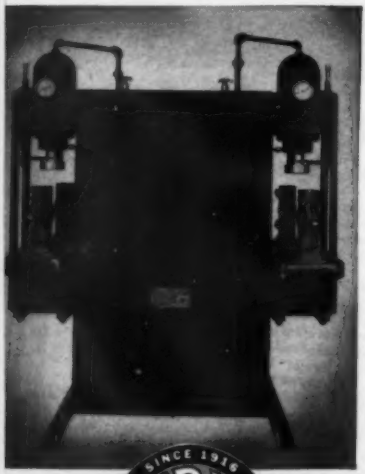

The exclusive design features which have given KRW Standard Presses their reputation for speed and efficiency are available to war production manufacturers who require presses of special design. The illustration above shows a *special*, extra high 75 ton KRW Press in comparison with the Standard 25 ton unit. Opposite illustration shows a special, 4-man operated, air-oil Press used for bomb loading.

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The Power Hack Saw

By CARLETON CLEVELAND

TIME saving is one of the big factors in insuring maximum production. The ever-mounting schedules have resulted in a turning to automatic machines wherever they can be used along the production lines of industrial plants, as well as in repair and maintenance activities.

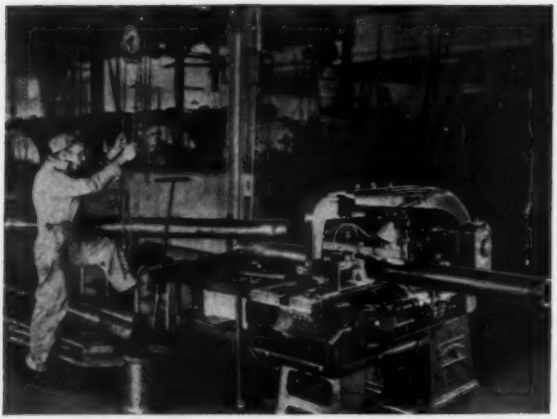
The power hack saw is a case in point. These machine tools are found cutting structural steel shapes, bars, tubing, die blocks, tough billets, and a wide range of special alloys. In an almost countless number of instances, where the initial operation is the cutting off of bar stock to specified sizes, the accuracy and speed of the power saw gives the manufacturer a head start on the very first operation.

In one plant, a battery of power hack saws, hydraulically controlled, cut 15" billets for forging 155 mm shells from stock 20 feet long and 5½" square. The blade is lowered to, and fed into the work under the correct hydraulic pressures. At the conclusion of the cut, the blade rises quickly clear of the cut for the next operation.

The sawing continues at the speed set on the dial indicator until the last remaining stub of steel stock is cut. For this type of work, it is very important that billets be cut accurately as to length and square so as to avoid trouble at the forge.

Power hack saws range in size from those weighing some 4,000 pounds for heavy production work, down to those small enough to be set up on a work bench. Small machines equipped with motors are frequently mounted on floor trucks, making portable units that may be moved about the plant premises wherever needed. A metal cutting ma-

Setting work in machine vise preparatory to starting cut.



Cutting S. A. E. X4130 Tube Steel, 1-¼-in O.D.

chine mounted in this manner is found to be a very serviceable piece of equipment in millwright departments, steel warehouses, garages, sheet metal work departments, etc., where it may be found convenient to move such machines to the jobs, rather than have workmen take the jobs to the machines. Then too, there is the added convenience of being able to move the machines out of the way when not in use, thus saving valuable floor space.

Metal cutting machines also differ in design. In some, the saw blade cuts in a horizontal or tilted position; in others the blade operates in a vertical position, being fed forward and backward, into and away from the work. Still another type uses the circular blade principle, with twin high speed circular saws, the work being exposed to two cutting edges, both working at the same time, each cutting half-way thru the metal. Another popular type is the contour sawing machine using a band saw—a handy machine tool for many types of production work, odd jobs, tool, die and maintenance work.

Many of the power hack saws now on the market are equipped with hydraulic control, so that the feed pressure is smoothly and accurately ap-

Group of power hack saws of various sizes in bar stock department of a machine tool plant.

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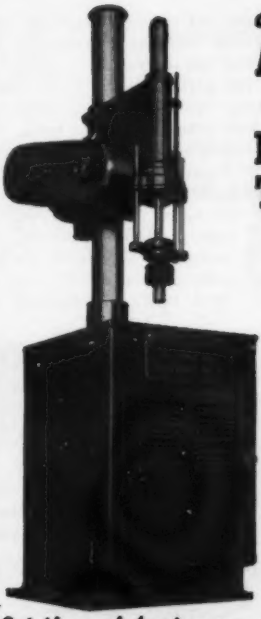

At Left—

Series LTM Light Duty High Precision Tapping Machine

At Right—

Series HTM Heavy Duty Precision Tapping Machine

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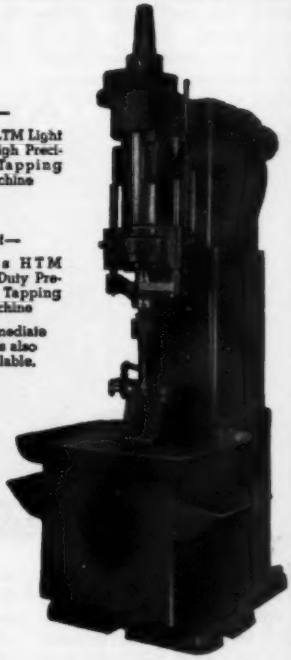

With such features as:

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- No end play in tap spindle

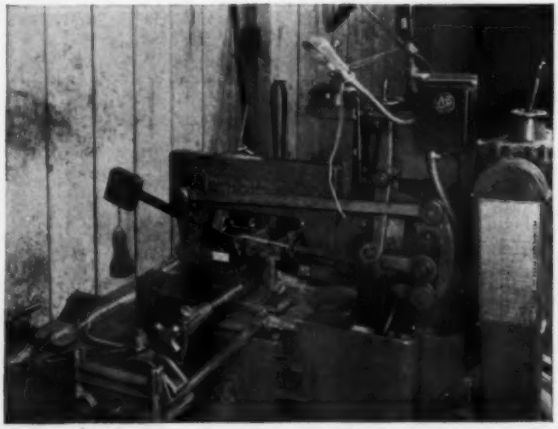
For complete details write for Bulletin No. TM-43

DETROIT TAP & TOOL Company 8432 BUTL DETROIT

plied thru a highly developed hydraulic system. This gives assurance that the right pressure always will be available to meet varying requirements. On some machines having hydraulic stock feed attachments, a low pressure hydraulic system feeds the stock forward in the predetermined desired lengths. A single adjustment clamps and releases the vise jaws, engages the clutch, and feeds the saw guide at the correct cutting speed. This complete automatic cycle is accomplished with a smooth, oil-cushioned performance.

and airplane carriers, power hack saws have become important items in the machine tool equipment.

In all industrial plants it is essential to keep pace with the output of modern high-speed machine tools. The extreme flexibility of the power hack saw finds many useful applications—for instance, cutting 6" diameter grinding plugs for naval valves, as well as fulfilling many other demands for speed and accuracy in metal cutting. Either a positive progressive feed or a flexible feed may be engaged in-



Power hack saw, showing speed and feed chart at right.

The hydraulic stock feed unit may be described as a single sub-assembly, embodying a simple piston pump, pressure valve and feed valve. It is self-contained, may be easily removed, and is free from complicated parts. The machine itself is independent of the stock feed, and may be operated as a conventional power saw without any changes or adjustments. A control knob immediately engages or releases the hydraulic circuit to the stock feed mechanism.

In arsenals, in all the heavy industries, even aboard battleships, cruisers,

stantly and at will—both being controlled by graduated dials for accurate settings. On some of the machines, the table swivels thru an arc of 45 degrees to obtain a variety of cutting angles.

In one industrial plant, metal cutting machines, 9 abreast in battery formation, are cutting oval tool steel stock 4 pieces at a time, day in and day out, with close accuracy. At this plant, high cost material is used and must be cut quickly, accurately, and at an acute angle with a minimum of waste,

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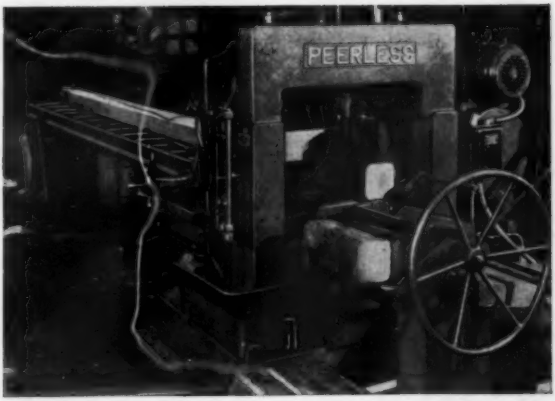

Cutting 15" billets from 20-foot lengths of stock.

since competition is keen in that particular field.

In another plant, a group or "nest" of bars, held securely together in rectangular formation by nest clamps, is loaded on the feeding table of one of the fully automatic hydraulic high speed metal cutting machines, and automatically fed beneath the saw blade and cut off simultaneously. A toggle gage provides means for engaging a nest or row of bars. The length of the pieces to be cut is determined by the setting of a pointer on a graduated scale, divided into fractions of an inch, eliminating the necessity for moving the bar stock or work against a positive stop.

A rather unusual application of the power hack saw involves the use of 2 blades to rough-cut the centers out of wing terminals at an aircraft plant. The parts are chrome molybdenum steel forgings, heat treated to between 32 and 36 Rockwell "C" and are cut 2 at a time. Two wing terminals are located in the work-holding fixture by slipping an arbor thru drilled holes and bushings, a guide block in the center of the fixture steadying the 2 saw blades.

For holding the work firmly in place, the machines are equipped with a heavy-jawed quick-acting vise, some arranged to swivel for angle cutting. One particular machine is described as

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having 2 sets of vise jaws, one set being on either side of the saw blade but may be quickly removed for fixture mounting when necessary. One set of the jaws is self positioning and arranged to swivel for angle cutting up to 45 degrees. Small machines are usually made with open leg bases, while the larger types have solid cabinet type bases.

A vertical-cutting saw is filling a need vital today in large forge shops where shell forgings and forgings for tanks and planes are being produced speedily in war-time volume. When hard-worked dies, for instance, wear dull and chip, a truing cut may be taken quickly on a vertical-cutting or contour saw. In cutting tangs in die-blocks, the work can be held at any angle and as little as 1/32" left for planing to finish. The large squarely-cut pieces of costly tool steel are left for use in making up shearing dies, smaller blocks, strippers, and stripper plates.

On many of the metal cutting machines is attached an instruction plate or chart, giving recommendations as to speeds and feeds for the cutting of the different types and sizes of material —for mild steel or screw stock; cold rolled and most alloys; high-speed steel and stainless; pipes, tubing, and bars. These instruction charts also give the speeds or strokes per minute at which the respective stocks at various widths and diameters are to be cut, together with blade recommendations as to length, number of teeth per inch, set, etc.

Using such an instruction chart, a new operator of a power saw will find that prior experience is not necessary. Any intelligent workman with average ability can control and operate such a metal cutting machine after a few hours of practice.

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Conserving Electrical Equipment

By C. W. FICK*

IT was my pleasure to hear Admiral King speak the other day. The gist of his talk was that everyone of us is involved in this war and has a responsibility toward it. Everyone of our jobs has a bearing in some degree on the outcome of this war. It becomes our duty then for each of us to survey our own job to see what can be done to help along in this great cause.

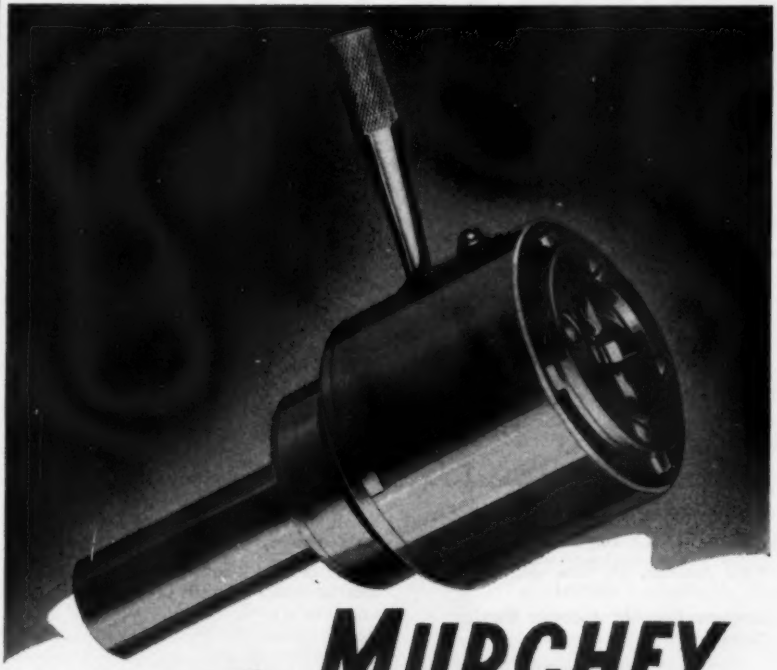
It is with this thought in mind that I wish to tell you of a few things the electrical industry is doing and recommending and thinking about, and how those things affect the maintenance engineer.

The materials required in fabricating airplanes, tanks, ships, guns, etc., and the materials which go into the machines that make them are wire, steel, copper, tin, aluminum, etc. Now it happens that these same materials are the ones used in making electrical apparatus. The magnitude of our production program is so great that even with all the productive facilities we have in this country, and which we at one time, not so long ago, thought were practically inexhaustible, the supply of these materials is being heavily overtaxed.

There just isn't enough of these materials to go around and do all the things we want to do with them. We had to quit making refrigerators, automobiles, and other similar things which we had come to regard as necessities. If we had not been willing to do without these things we would deserve to lose this war. Let's consider for a moment what can be done toward conserving materials used in electric motors, for example.

Electrical controls are being worked hard today, so it is doubly important that they be inspected regularly and that replacements or repairs be made quickly, when necessary.

*District Engineer, General Electric Co., Cleveland.



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In industrial plants there is a general lack of simple instruments, such as should be used frequently to check loads and voltage conditions, and thus to get the maximum life from electrical equipment.

Conservatism In Electric Equipment Design

There are certain limits to performance of an electric motor. If it is overloaded too much, it will get too hot and the insulation then has a very short life. Some basis of agreement had to be reached, therefore, on what temperatures could be endured and still permit reasonably long life for the motor. Studies of insulation life extended over periods of years and it was finally agreed that cellulose insulations, such as cotton, paper, etc., called "Class A" insulations, would last indefinitely, if the temperature to which they were subjected did not exceed 105° C.

Then, allowances were made for the inability to measure the hottest spot or spots in the motor. Another allowance was made for what might be the maximum temperature of the surrounding air in which a motor was operated. This was selected as 40° C. (104° F.) and we finally wound up with a motor rating based on a rise in temperature of 40° C., but with numerous safety factors. Such a motor, operating at full load will last, so far as heating goes, for 20 or 30 years.

Application Engineering

Some years ago, a survey was made to see how fully loaded industrial motors were. It was found that 80% were underloaded. This came about by everyone wanting to play safe. It was a praiseworthy motive in ordinary times. The machinery manufacturer would decide that this unit required let's say 12 hp. The standard sizes were 10 and 15 hp. So he would say, "Let's play safe and put on a 15-hp motor". The chances are that if 12 hp ever was required it was only intermittently and the 10-hp motor would, in the vast majority of cases, have gotten away with the job.

We cannot afford that sort of engineering today. There just aren't enough materials to permit it. We are either going to have to do with lower margins and factors of safety or we will have to do with fewer shells, guns, and other items of war machinery.

What Are We Doing About It?

The electrical industry is urging that machines be more closely motored than they have been in the past; that the application engineer know more definitely what power a given machine will require and then apply the motor that will drive that machine, perhaps only for the duration of this war.

It is true that increasing the temperature of a motor shortens the life of its insulation. But what if we do have a motor that will last only 5 years before it will have to be rewound, instead of 15 or 20, so long as it provides the materials necessary for our other urgent war needs? If the war is still going on 5 years from now we will have more

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worries than replacing a burned-out motor.

Of course, the application engineer must take all the factors into consideration in selecting the proper motor to do a job. Perhaps other considerations than heating are involved; and then the problem becomes a difficult one.

Other Effects Of Overmotoring

Motors operating at reduced loads operate at poor power factors. The light-load motor efficiencies are not as good as those when motors are fully loaded. Both of these effects increase the current required to drive a given machine. Higher currents mean increased copper loss in the feeder cables, and that loss goes up as the square of the current.

Motors should be kept free from dust and dirt by frequent wiping. This photo shows induction motor on small grinder being wiped clean.

A more important consideration for us in these times is that if a 15-hp motor could do the job, the engineer responsible for the distribution cable layout has to use the 15-hp figure and put in larger feeders, thus wasting copper. Transformer capacities are usually based on some load factor applied to the total installed hp and the more overmotored the load, the further off is the transformer size selected.

This accumulation of errors was worse when the old system of distribution was used involving one outdoor transformer with long secondary runs of heavy copper to the load. With the availability of non-burning oil transformers, such as Pyranol, it is possible to run the high-voltage leads close to the load and install a step-down transformer, with resulting short secondary runs.

Another step in the right direction is to keep the secondary voltage as high as feasible. Any new installations of 220-volt motors should be out—we just can't afford them in materials.

To give you some idea of what is involved in this respect, approximately 5 lbs. of copper per hp are used in the distribution system when a modern load-center system is used with 440-volts secondary. If 220-volt motors are used, the copper required is doubled and runs to approximately 10 lbs per hp. If the old outdoor step-down station system is used, feeder copper required is again approximately doubled, running as high as 20 lbs per hp. Obviously, here is a very fine opportunity to save copper in new industrial plants or extensions by using good engineering.

The Effect Of Maintenance Engineers' Work

I have cited, principally, the critical eye with which electrical manufacturers are looking at the motor application problem. The same applies to industrial control, where recommendations regarding means of saving critical materials have been made to WPB. You

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may have responsibility for selecting the size of motors for certain jobs, but my point in bringing this to the attention of maintenance engineers is to point out how it affects their work. When a 15-hp motor was used on a 10-hp job one didn't have to be so careful about keeping it clean. It could get plugged up with dirt and oil and still have sufficient radiating capacity. In short, it didn't require as close attention as a motor which is operating right up to capacity.

With the overmotored machine, the duty cycle could be stepped up without much consideration of capacity. We cannot afford to put in materials today on the chance that next year or next month the work required of a machine may be increased. We have got to know what the job is, motor accordingly, and then keep production schedules within the capacities installed.

In short, this whole situation of critical material loads more responsibility upon the maintenance engineer—a responsibility to do his job better and and a responsibility to assume a larger part in the production question in his plant, wherein production affects the load on the electrical apparatus.

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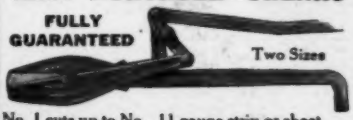

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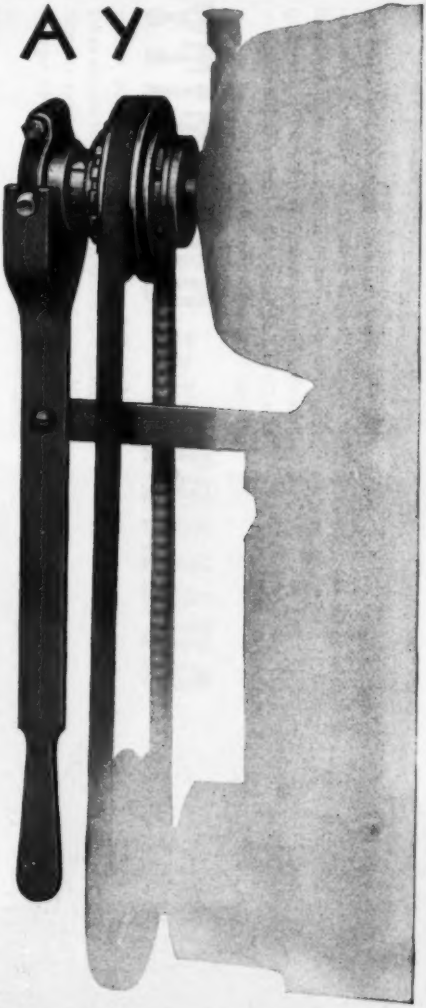

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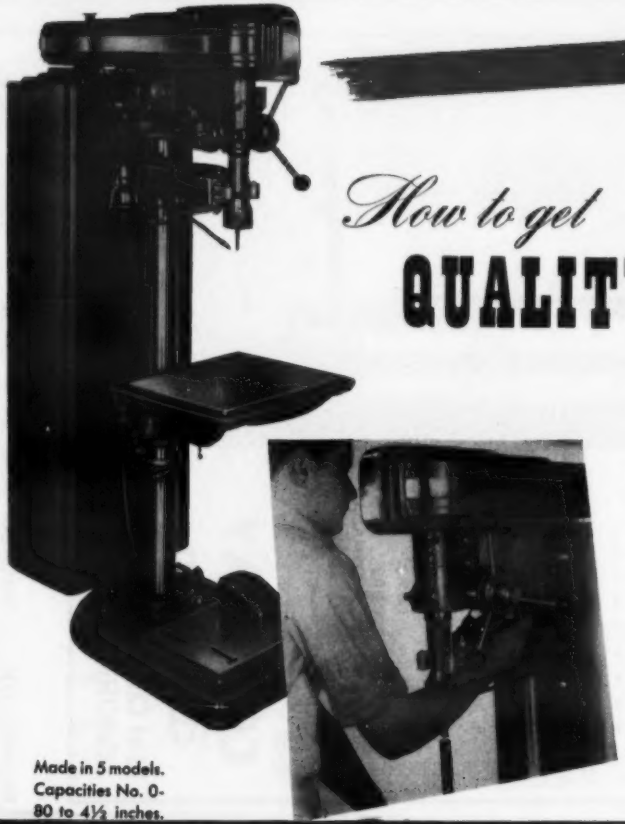

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Aspects of Modern Milling

Part V—Milling Terminology

By JOHN E. HYLER

THE great array of special milling machines designed especially to meet special problems, has caused fusion in the minds of some with reference to terminology. For instance, in speaking to a group of men about "plain" milling machines, one man in the group will understand me to mean all knee and column machines which have no swiveling or so-called universal tables. He will consider bed type machines excluded. Another will construe that by plain millers, I mean all milling machines of horizontal-spindle type which have no swivel-table action, yet which incorporate the standard type of table reciprocating action.

For the purpose of this discussion, the last man mentioned is assumed to be correct, Therefore, in our consideration of heavier models of plain millers, and auxiliaries applicable there to, bed types and certain others will be included, in attempting to make the

A candid camera angle shot showing the milling of slots in adding machine type with cartridge style fixtures. Each container holds 20 parts. (Courtesy Cincinnati Milling Machine Co.)

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The No. 3 Motor in Head Grinding Machine is ideally suited to the shop with a great deal of work. Its heavy construction and rigidity make it a first class production machine on many types of work.

With the set of attachments furnished this grinder may be used for sharpening taper or rose reamers; spur, bevel, spiral, formed or end milling cutters; drills, countersinks or counterbores. Easily set up for the accurate grinding of straight or taper arbors, keys, gages and the edges, sides and the ends, of flat, square, hexagon, or octagon bars.

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text clear with reference to each, as we proceed.

With particular reference to bed type plain millers, the outstanding and immediate difference between them and knee and column type machines is solidity of the table mounting. It rests and travels upon a cabinet-type bed which extends directly to the floor. You will see at once that, where heavy workpieces are to be handled almost exclusively, the bed type machine will be better, not only from the stand point of supporting the combined weight and down-thrust of the cutters, but also because the table always remains at the same height. Material of a heavy nature may be brought directly to the level of the table on constant-height conveyors, if one chooses to install them. Since the table may be adjusted for height, it is necessary to mount the milling machine spindle in a head or yoke that is vertically adjustable. Usually the height adjustment of this spindle is made with a convenient handwheel at top of the machine.

Over against the advantages cited, the bed type of machine is admittedly somewhat more difficult to set up than the knee and column type, largely due to restricted lateral adjustment possible between cutters and work. Sometimes the design of the bed type machine incorporates such lateral adjustment as may be had on the spindle itself, the latter being mounted in an adjustable quill for this purpose. In other cases, lateral adjustment will be provided by interposition of a saddle between table and bed, the saddle being adjustable on the bed. In either case, adjustment is very much restricted as against what may be obtained on a machine of the knee and column type. As a result, great care must be used in positioning cutters on the arbor, and work on the table, in as close to perfect relationship,

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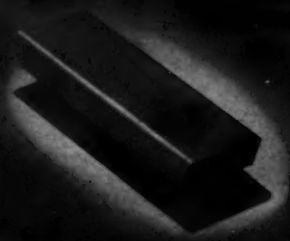
transversely, as may be. A point in strategy is to set the adjustment on the spindle, or on the saddle of a bed type machine, as the case may be, as near to the center of its scope as possible, before making your actual setup of cutters and work. That will allow you a certain amount of leeway, touching lateral adjustment in either direction to compensate for error. In fact, keeping lateral adjustment on center under normal conditions is a good point to remember on any milling machine.

You will realize, with these points in mind, that the bed type of machine is better adapted to fewer setups and long runs of heavy material, while the knee and column machine is the one to select when you have many setups and short runs. But regardless of what has been said, it should be remembered that bed millers as made by leading tool builders are far more convenient than in days gone by. One highly efficient bed type plain miller which has recently come to my attention not only offers faster setting up than on many machines of this type, but has complete electrical control for the table. It also incorporates a special automatic backlash eliminator on the table feed screw, which permits "climb" or "hook" milling.

In so-called climb milling, instead of the teeth of the milling cutter approaching the cut along the horizontal surface just milled, they bite downward into the surface of the rough material and leave at the finish-milled surface. In other words, it is "down-cutting" instead of "up-cutting". This has been found especially good for some types of work, especially where rather deep or heavy cuts are being made in relatively small work which is hard to hold on the table. When cutters are making an "up" cut, they tend to lift the material from the table, under which circumstance it moves more readily. But when a "down" cut

Conserving High Speed Steel.....



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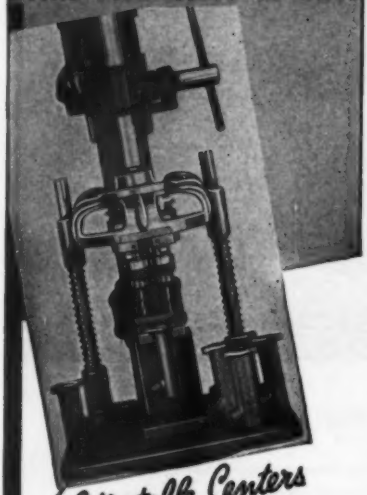

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✓ *Drill Capacity 0" to 5/8"*

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is being made, the thrust of the cutters is added to the weight of the work and the power of the holding devices in securing the material solidly to the table.

Over against this, however, the action of the cutters is to exert a pull in the direction of table travel instead of against it, and therefore any end-play present in the feed screw will manifest itself under ordinary conditions, causing backlash and chattering. That is the reason for the backlash eliminator mentioned as applied to the feedscrew.

There are many special devices which may be employed in connection with plain millers, to make them adaptable to fast production, even on small work. Index centers, for instance, may be used to hold different kinds of small round work. They may be made in multiple, to hold a number of pieces spaced in a row. in order that multiple cutters mounted on the milling machine arbor may machine them all at one time. In the case of some friction sleeves that came to my attention, being milled on a small plain miller, fitted with triple index centers, 3 slots were milled in each of the sleeves, 120° apart, and a production rate of 234 sleeves per hour reached. The machine in question was fitted with a foot-treadle to engage feed of the table. From that point on, feed was automatic until the table returned to starting position. Three friction sleeves were put in place, the pedal depressed, and the table run forward at fast feed until it reached the working point, where it slowed down to consistent feeding speed for the material being milled. As soon as the travel had proceeded far enough to make the proper cut, the table reversed at high speed until it reached the starting point. Then the triple index centers were indexed thru 120° and the treadle again depressed.

Different speeds of milling machine table travel, as mentioned, are readily

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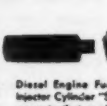

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obtained on modern millers thru use of dogs arranged along front edge of the table. The contact points of the dogs are arranged in 2 different rows, one to throw in the particular feed-speed traverse being used, and the other to throw in the rapid traverse. The dogs are capable of being fastened at any point along front edge of the table, in a slot provided for the purpose. Some machines, I understand, have 2 separate T-slots to accommodate 2 rows of dogs. In others however, offset dogs are used, and only 1 slot is required. By turning the dog offsets in opposed directions as the case may require, 2 rows of dog points are obtained, tho only one T-slot is employed in the front edge of the table for the purpose. Thru changing position and arrangement of dogs, any combination of fast traverse and regular feed traverse may be obtained. Thus, while the cutter is not in the work, table is being traversed at high speed to cut down idle machine time. While in the work, it is traveling at what has been predetermined as the maximum feed practical for the cut being made.

How would you go about it to mill slots in tiny parts like adding machine type, using a plain miller for the job? Take a look at the illustration, and you will see how the job is handled in one place to extreme advantage. The woman at the machine is loading parts into little cartridge type fixtures. The holding device is slid into the fixture shown on machine table and the fixture clamped; she flips the cycle starting lever, and lets the machine do the rest while she loads another container with parts to be milled.

For the particular job shown, any good plain miller with an automatic cycle on the table feed should do very well, but it so happens that the machine shown is one into which a remarkable modern device has been incorporated. I refer to what is known as an auto-

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is made for the smallest tool room lathes as well as the largest railroad shops. Severe conditions are no hazard to the accuracy and long life of the large taper thrust and annular roller bearings. Precision mounted, front bearing cone seats on resilient pad—a shock absorber protection against tool breakage. Available in taper shank, slip in, slip over and spindle types. For unconditional proof, test in your own plant.

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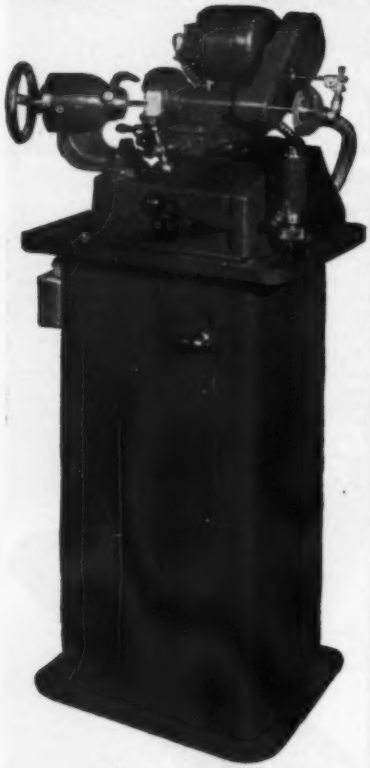

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CAPACITIES:

Machine Screws to 1½" hand taps.

Can be arranged for any number of flutes —right or left hand.

ALL TAPS HELD BY SHANK.

Can be sharpened after center is destroyed.

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matic rise and fall spindle carrier. I mean that the spindle can be raised and lowered, automatically in perfect timing with the feed of the table, to obtain various results on special milling jobs. This provision is convenient, for instance, in cases where you have to mill work that has projections extending upwardly, which must be left standing. In such cases, the table cannot traverse the work directly into the cut. With the rise and fall provision incorporated, the cutters may automatically be let down to contact with the work at any pre-determined point, and lifted in the same manner.

There are different ways in which this automatic rise and fall spindle carrier may be utilized on plain milling machines, to do other than plain milling. For instance, rise and fall of the spindle may be governed by a cam, attached to the fixture in which work is being milled, with a cam roller engaging top or formed edge of the cam. Any cut which does not contain an angular departure of more than 30° from horizontal may be negotiated by this means. So you will see that such a miller actually becomes a profiling machine of the copying type within this scope. The cam roller used, incidentally, has a conical contour on the end which engages the cam. It is carried by a quill, adjustable endwise, so that compensation may be made for reduced diameter of the milling machine cutters as they are ground from time to time. The cut may be duplicated exactly thru the life of the cutter, tho latter is continually becoming smaller in diameter.

Rigidity is an important thing to look for in any plain milling machine. But, as mentioned or implied before, rigidity is a thing that must be considered against the particular kind of work to be done. Again, the price one pays for a machine will have something to do with the degree of rigidity obtained.

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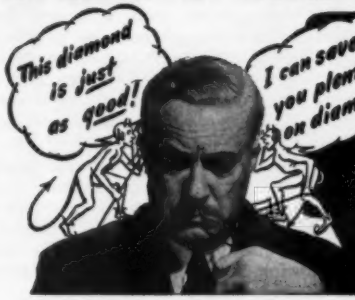

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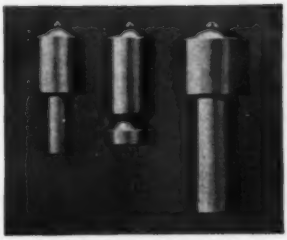
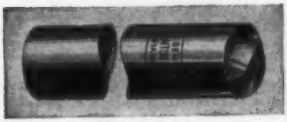


Landis, Norton, Cincinnati Nibs



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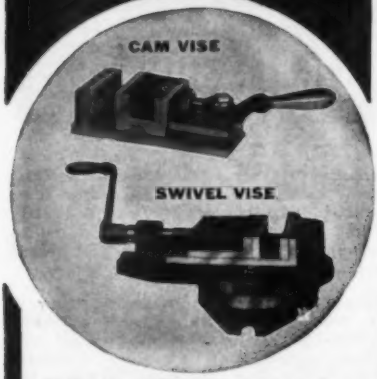

"MODERN" VISES are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

CAM VISES—Jaw dimensions: width 4" or 5", depth 1½", maximum opening 2" or 3".

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Where small parts production is continually in view, and no heavy work or heavy cuts are handled, there is no particular point served in requiring rigidity far greater than will ever be needed. Some machines are particularly designed for small parts production. A good one of this type has a wide range of spindle speeds, anywhere from 75 to 1200 rpm, and has proven popular for this type of work.

In an article to follow, additional plain millers, further attachments and devices to render them more productive and more versatile will be considered. No man questions that this field is one of growing importance in overall effect on metal working problems.

It is believed that further consideration will prove to be both interesting and profitable.

EDITORIAL NOTES—

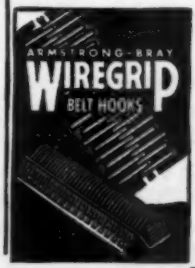
Bed type plain miller mentioned, incorporating automatic backlash eliminator on table feed screw to permit climb milling, is made by Brown & Sharpe Mfg. Co., Providence, R.I.

Plain miller mentioned on the friction sleeve milling job, using triple index centers, is made by Brown & Sharpe, as were also the index centers used.

Milling machines, using offset dogs in a common T-slot to obtain 2 rows of dogs for control of table traverse, automatically, are made by Brown & Sharpe.

Machine shown in illustration, slotting adding machine type, is made by Cincinnati Milling Machine Co., Cincinnati. They can furnish milling machines with automatic rise and fall spindle carriers, and fit them in various ways to take advantage of this motion for specific jobs.

Plain miller mentioned as designed for small parts production, and which has wide range of spindle speeds, varying between 75 and 1200 rpm, is made by Douglas Machinery Co., Inc., 150 Broadway, New York City.



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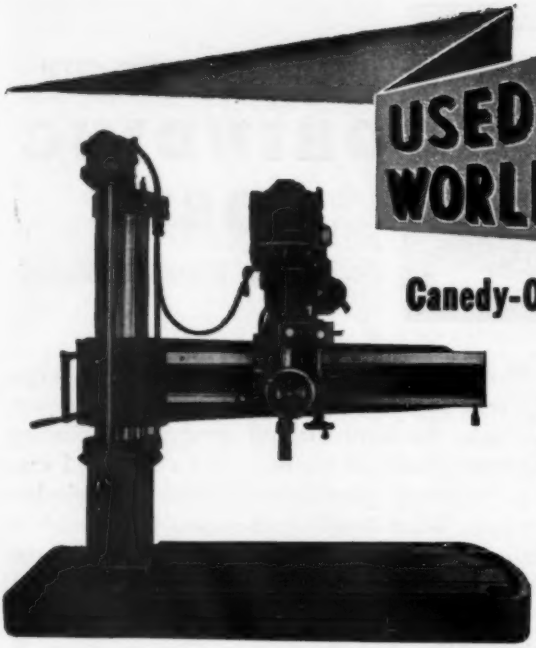

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SPECIFICATIONS:

	9" Column 3' Arm	11" Column 4' Arm	11" Column 5' Arm
Drills to the center of circle on base or table	73½"	98"	120"
Length of arm	3'	4'	5'
Greatest distance from spindle to base	43½"	48"	48"
Minimum distance from spindle to base	9½"	16"	17"
Minimum distance from spindle to column	10½"	10"	10"
Traverse of spindle	9½"	9½"	9½"
Hole in spindle—Morse Taper	No. 4	No. 4	No. 4
Diameter of spindle at nose	2½"	2½"	2½"
Traverse of head on arm	25½"	36½"	48½"
Traverse of arm on column	21½"	24"	24"
Spindle speeds with 1200 RPM motor	(60, 85, 130, 180, (425, 560, 860, (1200 RPM		on all models
Spindle speeds with 1800 RPM motor	(85, 130, 180, 274, (560, 860, 1160, (1750 RPM		on all models
Feeds per revolution of spindle	(.004" .007" (.010" .020"		on all models
Bearing of arm on column	14"	16"	18"
Size of main driving motor	2 HP.	2 HP.	2 HP.
Height of drill column over gears	89"	98"	98"
Working Surface of Base	29"x45"	36"x60"	36"x88"
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Broach "Do's" and "Don'ts"

By HARRY GOTBERG*

TREAT a broach as carefully as you would any other precision cutting tool in your shop.

Don't expect a broach to correct excessive eccentricity due to inaccurate previous machining. It is best practice to use the broached hole as the "locating point" for subsequent o.d. turning or facing operations where close concentricity must be obtained.

Always check the suitability of a broach for the specific job it is to do. The material, length of broached hole, broaching speed, broaching fixture and type of broaching machine all affect satisfactory broach performance.

Never permit the cutter teeth of a broach to come into contact with a hard metal edge or surface since the cutting teeth of broaches are generally extremely hard and may be damaged.

Always transport broaches carefully to avoid striking the teeth against any metal surface. Preferably transport and store them in specially designed tote boxes or bins fitted with wood or other soft materials where contact with the broaches takes place.

Grind only enough metal from each tooth of a broach to bring it to required sharpness. Grinding away more than the necessary amount on each tooth shortens the life of a broach. Only a few special broaches require that the same amount of metal be removed from all teeth.

Use adequate equipment, designed especially for broaches when sharpening them. Broach life is materially shortened if correct tooth form is not maintained and the broach is not held properly in the sharpening machine.

Use the right type of grinding wheels when sharpening broaches. The wheel size, grain and grade are important in obtaining sharp cutting edges without burning the metal, and in least time.

Before deciding on any broaching set-up, make sure that the broaching machine is of adequate capacity for the specific job to be performed. Broaching speed and smoothness of operation not only affect the broaching time, but also quality of the work done.

In making any broaching set-up, check alignment of the puller and guide bars (if used) with the centerline of face-plate or platen before mounting the fixture.

In hole, spline and keyway broaching operation, check alignment of the fixture with centerline of the broach, puller and guides before starting operations.

In helical spline broaching, keep backlash and wear of the broach drive head and lead bar at a minimum. It is difficult to maintain close limits on helix angles, if excessive wear exists.

Design the broaching fixture or face

*Chief Engineer Colonial Broach Co., Detroit

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He was new in the place—his first job was checking odd lots of shafting. All ready, except for calipers—not a pair to be found.

"Hey, loan me your calipers" he yelled across to the next man—"what kind of a place *is* this that doesn't have scads of 'em in easy reach?"

But that man's calipers couldn't be spared. In fact, it finally developed that no dealer in the city had any in stock. But as usual—

The representative of an Industrial Supply Company happened to know where he could pick up a box of brand-new ones that the owner didn't need and was willing to sell. Everybody happy!

This incident is typical of the unusual services that many Mill Supply Distributors are rendering their customers during the Emergency

The Representatives of *your* nearby Industrial Supply Houses not only can do a "Sherlock Holmes" helping you unearth scarce materials now and then, but can lend your short-handed Purchasing Department valuable help in other ways besides.

You can call in their help with full confidence—because they are our own Industrial Distributors, selling Cle-Forge High-Speed Drills and Peerless High-Speed Reamers throughout America during many years.

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plate adapter used in round or spline broaching for as small a clearance as possible without making it too difficult to insert and remove the piece to be broached.

In all surface broaching operations, make sure that the fixture is sufficienty rigid to prevent movement of the piece.

Design holding clamps which retain the piece in the fixture so that the piece cannot slip during the broaching operation, even if an unusually heavy load is encountered, such as one due to additional metal in a forging or casting, a hard spot, etc.

When broaching from a cored hole in a casting or a forged hole it is preferable to use an equalizing fixture to avoid excessive eccentricity of the load on the broach.

Make sure when broaching from drilled holes, that the hole is square with the face of the piece which contacts the fixture.

Design all indexing mechanisms so that no backlash can occur while a piece is being broached.

Always complete the broach pass and remove the piece before reversing the machine and returning broach to initial position.

Before starting the broach pass, make sure the piece is firmly and fully seated in the fixture. Slippage or "jumping" of the piece during the pass may break teeth from the broach (surface broaching) or break it in two (hole broaching).

If a broach becomes stuck in the work (due to failure of power supply, etc.) never reverse the machine or try to push the broach out backwards (against its normal cutting direction). Tooth breakage is almost certain to occur if this is done while the broach is in the machine.

Should the piece become stuck on the broach (internal or hole broaching), remove piece from broach by one of these methods, after first carefully **removing both stuck piece and the broach from the machine:**

(1) Gently tap the piece evenly and slide it off the starting end of the broach. If the piece cannot easily be removed by this method, then

(2) Place the stuck piece and broach in a lathe and turn the piece from the broach, or—

(3) The piece may be sawed in two with a hack saw and thus freed of the broach.

(4) A combination of methods (2) and (3) may sometimes reduce the time required to free piece from the broach.

In surface broaching, if the broach becomes stuck before the pass is completed, proceed in this manner:

(1) Loosen piece in the fixture by clamping it, if a non-retracting table or fixture is used. Then loosen the fixture and withdraw it from the broach.

(2) If the broaching machine has a receding table, carefully retract the broach table. Only the lightest force should be used while doing this.

(3) Check the broach, fixture and table to make sure that no broken parts of the piece will catch between the fixture and broach when broach is returned to starting position.

LESLIE HAND PUNCH PRESS
MOST CAPACITY
POSITIVE ALIGNMENT
9A
Max. cap. 2" dia. hole thru 10 ga. iron, proper shear on punch, throat depth 6". Takes punch presses up to 3"x4½" in area.
Leaf arm gives perfect alignment without ways or leader pins. Portable.
Ask your dealer, or write for circular
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2947 Carroll Ave Chicago

EFFICIENCY—Not Emergency—

Is Dictating the Swing to Bonded Lapping Stones

More and more, manufacturers of precision parts are turning to bonded abrasive lapping stones. More and more, bonded abrasive lapping stones are replacing the more conventional cast iron lapping blocks.

Instinctively, in times like these, you'll say: "It's the war and the shortage of metal." But that's not entirely true.

Bonded abrasive lapping stones have earned a place in the shop purely on their own record. Developed long before the shortage of metal became acute, abrasive lapping stones have proven their worth over and over again. Naturally, the current shortage of metal has accelerated the speed with which discerning production men have adopted this comparatively new lapping practice. But, even so, no one can ignore the fact that bonded abrasive lapping stones will:

1. **REMAIN FLAT FROM TWO TO THREE TIMES LONGER THAN CAST IRON BLOCKS.**
2. **RE-FLATTEN MUCH EASIER THAN CAST IRON BLOCKS.**
3. **ELIMINATE ALL POSSIBILITY OF CHARGING THE WORK WITH LOOSE ABRASIVE, THUS CAUSING FRICTION WHERE ULTRA-SMOOTHNESS SHOULD PREVAIL.**

Those are the principal reasons behind the switch to abrasive lapping stones. In other words, efficiency — not emergency — is dictating the change.

The Mid-West Abrasive Company has pioneered the trend toward refined honing and superfinishing of working parts. MID-WEST lapping stones, like MID-WEST honing and superfinishing stones, are made with MICRO BOND, the remarkable new abrasive developed by MID-WEST engineers that has created new standards in precision manufacturing practices.

Although MID-WEST honing, superfinishing and lapping stones cost more than average abrasives at the outset they are more economical in the long run because they last longer, perform more efficiently, leave a finer, more precise finish and result in fewer rejects. Our engineers — located in all large cities—are eager to prove these claims.

MID-WEST ABRASIVE COMPANY

Manufacturers of DEPENDABLE Abrasives

1960 E. MILWAUKEE AVENUE — DETROIT, MICHIGAN

★ *Honing Stones*
★ *Superfinishing Stones*
★ *Grinding Wheels*
★ *Emery Cloth*
★ *Sandpaper*

Mid-West Abrasive Company,
1960 E. Milwaukee Avenue,
Detroit, Michigan

Gentlemen: Please send me additional information on Mid-West Micro Bond honing and superfinishing stones.

Name _____

Company _____

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_____

Extending Tool Life By Cleaning Castings

INCREASED tool life in machining bronze and aluminum castings is reported by customers of Bronze Alloys Co., St. Louis, following a change in casting cleaning methods.

This company is said to have been one of the first commercial non-ferrous foundries in the St. Louis area to adopt an airless blast method for cleaning castings. A Model 20x27" Wheelabrator Tumblast, furnished by American Foundry Equipment Co., Mishawaka, Ind., replaced wet tumbling for cleaning all castings.

Faulty casting rejects mounted sharply with the change in cleaning methods, indicating the penerating airless abrasive blast was opening pockets in castings that were not visible on inspection after cleaning in a wet tumbling barrel. Such defects, however, more often than not had turned up in subsequent machining operations on wet tumbled castings by the foundry's customers, sometimes resulting in rejects while at other times the castings were not returned because the imperfection found on machining was not at a point where it would seriously weaken the casting or impair its performance in the final assembly.

Casting defects revealed by the Wheelabrator made necessary a thoro study of all factors that could contribute to a faulty casting. When needed changes in moulding practices were made, rejects were reduced to about 2 percent. Of even greater importance is the fact that an imperfection is revealed before the casting leaves the foundry. It is seldom that a Wheelabrated casting from Bronze Alloys Co. is rejected as imperfect by a customer.

The American Wheelabrator Tumblast used by Bronze Alloys Co., to clean bronze and aluminum castings employs centrifugal force to propel steel grit upon the work.

Foundry sand and heat-treat scale on castings greatly shorten the life of cutting tools and abrasive wheels. Often a casting may pass thru a cleaning operation and appear perfectly clean—while actually sand and scale may have been left in deep pockets and corners. The sand or scale nicks a metal cutting tool in a turning or milling operation, or disturbs the trued face of an abrasive wheel in a grinding operation.

The imrovement in tool life in machining Wheelabrated castings was

Angle view, work in chuck. Headstock graduated through 180 degree.

Looking down, from grinder head end.

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View from headstock end, guard removed showing step pulleys providing various speeds of work head. Headstock may be slid crosswise any distance up to 6".

Grinds holes ¼ to 18" diameter . . holes up to 9" deep, straight or tapered. Will handle a wider range of work than has heretofore been possible on any one model machine . . sturdily constructed throughout . . complete specifications, delivery and price on request.

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Saw-way INDUSTRIES

Machine Tool Division

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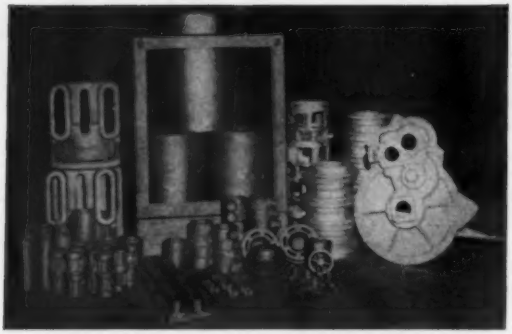

A large variety of shapes and range of sizes is cleaned by airless blast at Bronze Alloys Company.

quickly noticed by Bronze Alloy's customers, with the result that, altho the foundry's entire production is now cleaned by this method, a Wheelabrated finish often is specified in the customer's order.

The machine employs centrifugal force from a wheel turning 2250 rpm to throw abrasive against the work at 1150 feet per minute. The work tumbles on a rubber apron conveyor, and all sides of every casting are exposed to the abrasive blast.

Abrasive, after blasting against the work, filters thru the load and, along with foundry sand and dirt removed from the castings, passes thru perforations in the apron conveyor into a hopper directly below. Arabsive and sand are gravity fed to a screen where refuse is screened out, and then dropped into the boot of a bucket elevator. Thence it is lifted to an overhead hopper where dust and sand are airwashed from the abrasive before it feeds by gravity into the centrifugal wheel for reuse.

No compressed air is used by the machine.

At Bronze Alloys, gates are not removed from castings before cleaning, and much of the work is heat treated before reaching the Wheelabrator. An average load of bronze castings weighs 500 pounds, with aluminum loads running lighter but occupying the equivalent space. Size of castings cleaned ranges from a few ounces to 500 pounds, with a similarly wide range in shapes.

A load of bronze castings is cleaned in 5 minutes, while only 2½ minutes is required to clean an aluminum load. Size 60 grit is used for all work.

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Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

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USE DESPATCH FURNACES

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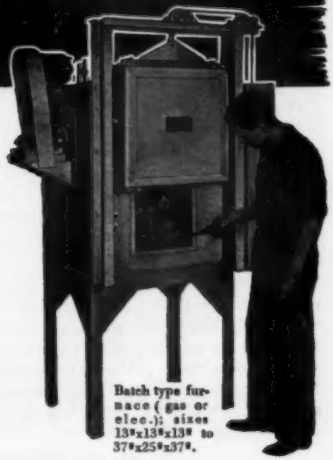
PRECISION PARTS



Batch type furnace (gas or elec.); sizes 13"x13"x13" to 37"x25"x37".

Pot type Despatch recirculating convection furnace. Working sizes 8"x12" to 60"x60". Also special high temp. models.

"TRICKY" is just the right word for some of the new "NE" steels for tools and dies . . . unless you have a furnace capable of speedy, accurate heat-treatment.

Despatch furnaces are excellent for this purpose. UNIFORM heat is guaranteed in chamber regardless of load size, with ACCURATE temperature control assured at any point in heat range 275°F—1250°F.

SPEEDY heat transfer and distribution increases efficiency, aids production.
FLEXIBLE for many processes; wide utility.

WRITE TODAY! Ask for Bulletin 81C (pot type) furnaces; or Bulletin 83-C (batch type).

DESPATCH OVEN COMPANY
MINNEAPOLIS MINNESOTA

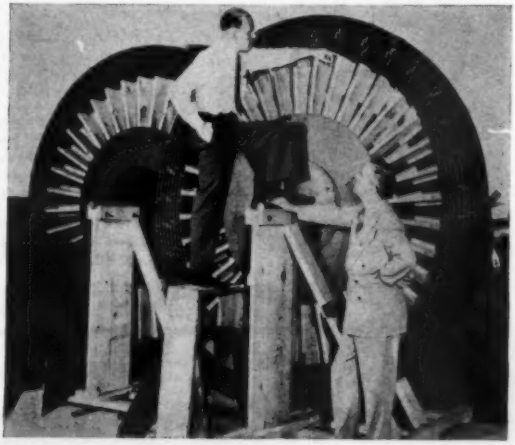
100,000,000-Volt X-Rays and Electrons

HOUSED in a special building with three-foot concrete walls, a machine to speed electrons to energies of 100,000,000 volts, producing x-rays of the same power, is being constructed as an addition to the General Electric Research Laboratory.

The machine is called an "induction electron accelerator" and is designed to give electrons energies far higher than have ever been given by a human agency before. It will provide science with a new tool, the full capabilities of which will have to be explored.

One of the investigations with the equipment will be a determination of the maximum thicknesses to which x-rays can be applied usefully for examination of armor plate and other very thick cross sections. Eight inches of steel represents the practical limit for convenient use of the present million-volt industrial x-ray unit. Increased voltage, above a million, will increase the penetrating power of x-rays. Since the new accelerator will produce x-rays at any voltage to a hundred million, it will be used to determine the useful limit.

Dr. Ernest E. Charlton, head of the x-ray section of the G-E Laboratory, and W. F. Westendorp have been responsible for the design and construction of the new accelerator. Its main part is an huge electromagnet, weighing 125 tons. Because it works with alternating current, this could not be made solid. Instead, it is being constructed of more than 100,000 pieces of silicon steel, each 0.014" thick. These are fastened together with a special cement to make large steel slabs from



Dr. E. E. Charlton (right) and W. F. Westendorp, with the large coils to be used in the induction electron accelerator.

with **Senacon AIR MOTORS**

SENACON Air Motors are complete self-contained reciprocating power units employing an exclusive "normal positioning" integral valve. Valve levers can be operated from any angle in any plane. Drag link connection to appropriate machine tool element gives full automatic synchronization of auxiliary motor movement with main machine tool.

SENACON Air Motors are pyramiding output daily on such synchronized auxiliary power operations as opening and closing holding fixtures, moving tools and work pieces to and from each other, operating latches and clutches, etc.

Wherever hand operations are involved, use of SENACON Air Motors for auxiliary power service will increase production by eliminating operator movements, reducing operator fatigue, increasing tool life, reducing rejects, etc. Records of increased production range from 50 to 1500 per cent. Write for latest catalog number, BB12.

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SENACON Air Motor operating special collet holding fixture on drill press. Air Motor automatically synchronized with drill press movement via drag link connection to quill.

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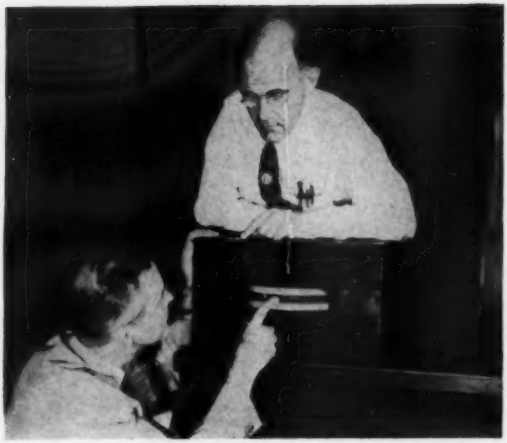
PNEUMATIC MACHINE TOOL DEVICES

SPEED PRODUCTION WITH AIR POWER



Dr. E. E. Charlton (left) and W. E. Westendorp with a model of the 100,000,000-volt induction electron accelerator.

which the magnet will be assembled.

At the heart of the magnet, between the 78" diameter pole faces where the magnetic field will be most intense, will be a six-foot hollow glass "doughnut," inside which the electrons will be elliptical, 5" high and 8" across. The wall will be about ¼" thick. It will be assembled of 12 molded sectors, which are being made by the Corning Glass Works.

The doughnut is really a merry-go-round for electrons. Starting from an "electron gun" (containing an electrically heated filament like that of a small electric lamp), they will be whirled around a quarter of a million times in 1/240th of a second, on each trip receiving a 400-volt push. Their total travel will be about 800 miles, which means that their path has to be guided with extreme accuracy. As Dr. Charlton stated, it is "like shooting on a curve for a distance as great as from Schenectady to Chicago and hitting a 3" target."

Operation of the electron accelerator is similar to that of a transformer, used for changing a-c voltage. Essentially, a transformer consists of 2 coils around a steel core. Current is passed thru one coil, the primary, and another current comes out of the other, the secondary, even tho there is no direct connection between them. If there are twice as many turns of wire in the secondary, the final voltage is twice as great as that applied. If the secondary has only half as many turns, the output voltage is half of the input.

In the accelerator, the "primary" consists of two 98" coils of insulated copper conductor 0.88" in diameter. Each coil has 40 turns and contains a ton of metal. A secondary, consisting of a coil of many turns, could be placed between the magnet poles and current would flow in it and from it.

An electric current consists of a flow of electrons between the atoms of a conductor. However, they can be made to travel in space, without any conductor, and this is done in the accelerator doughnut, where the interior of this vacuum tube acts as the secondary of the transformer.

The electrons are speeded up during the first quarter of each cycle of the

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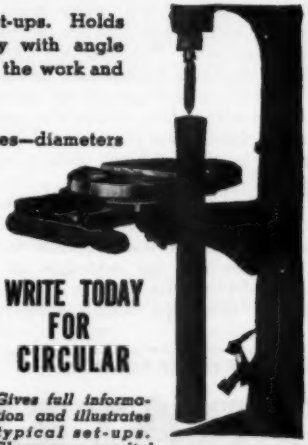
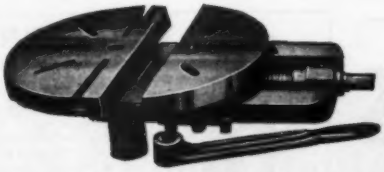
The Combination is made in various sizes—diameters from 8" to 27½", weighing from 27 to 600 lbs. Made of the finest materials, for long life. Easy to install. Specify the diameter of your shank in thousandths of an inch. We supply the drill table and vise with shank turned to size specified.





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Gives full information and illustrates typical set-ups. Shows use on radial drills. Complete specifications of all models including the square, all steel tables.

MODERN MACHINE TOOL CO.

Jackson, Michigan

alternating current, which changes 60 times each second. At the end of this quarter cycle, the high-energy electrons will strike a target and generate a beam of highly penetrating x-rays, which will emerge from the machine, together with scattered high-speed electrons. Even these electrons will be able to penetrate approximately 2" of steel. It is for protection against them, as well as against the x-rays, that the walls of the building are made 3' thick.

The copper coils and most of the laminated steel slabs for the magnet have been completed, and the building is also finished. Built of concrete with brick facing, and glass brick, it is about 47 by 50' and 34' high. The concrete walls, 3' thick around the machine room, extend down 6' below the floor level.

In the machine room will be a crane capable of lifting the 60-ton upper part of the magnet. This crane is to be used in assembling and in servicing the accelerator. The control room is outside the thick wall, and a periscope using 4 mirrors will permit the operator to watch with safety. Above the control room is the largest single bank of capacitors in the country, with a capacity of 24,000 kva.

"As far as we know," said Dr. Charlton, "Dr. Donald W. Kerst of the University of Illinois was the first to apply successfully the principle of the present device. He built a small machine of this type, which accelerated electrons corresponding to about 2 million volts.

"Last December one of 20,000,000 volts was completed in the G-E Laboratory, with assistance from Dr. Kerst. This has now been loaned to the University of Illinois, where he is carrying out experiments with it. The 100,000,000-volt machine thus becomes the second electron accelerator to be built by G-E."

In its principle, the induction electron accelerator bears a superficial resemblance to the cyclotron, but it is quite different. The cyclotron speeds positive particles by whirling them around in the field of a powerful direct-current magnet. The particles are accelerated only when they cross the gap between the D-shaped semicircular boxes, inside which they coast in a curved path on the rest of their journey. In the accelerator, the electrons are speeded continually, and reach almost the speed of light.

Discussing the future of the electron accelerator, Dr. Charlton stated: "With the use of million-volt x-rays in industrial radiography, we can examine large castings, but the practical limit with this voltage is about 8" of steel. We have been asked concerning the possibility of radiographing much thicker steel pieces. The induction electron accelerator, making available x-rays of voltages up to a hundred million, will give us the answer to this question."

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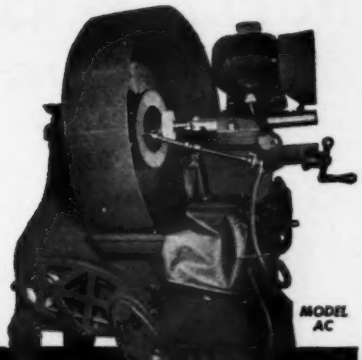
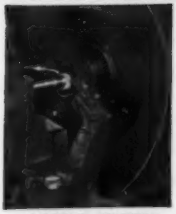


MODEL AC

GRINDERS

WITH

AUTOMATIC SIZER FOR PRODUCTION RUNS



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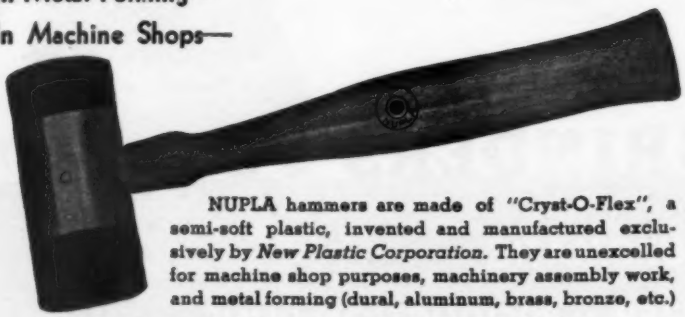

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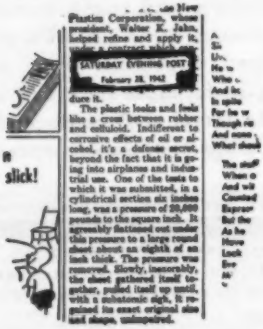

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1 "	8 oz.

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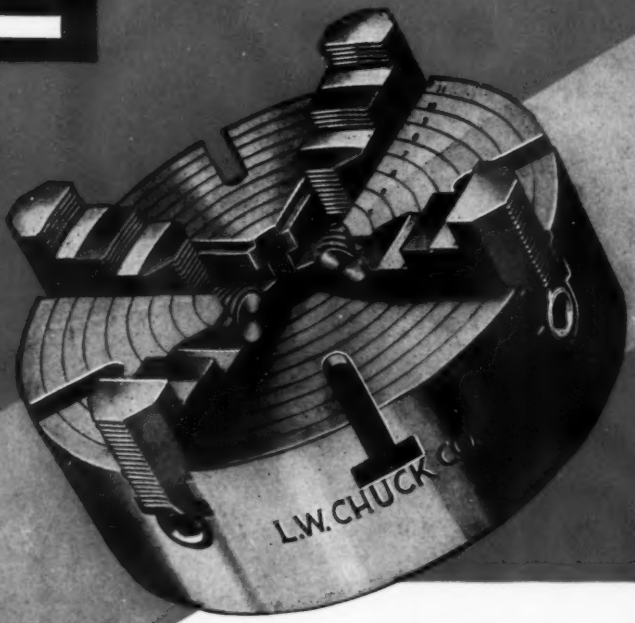
L-W LATHE CHUCKS



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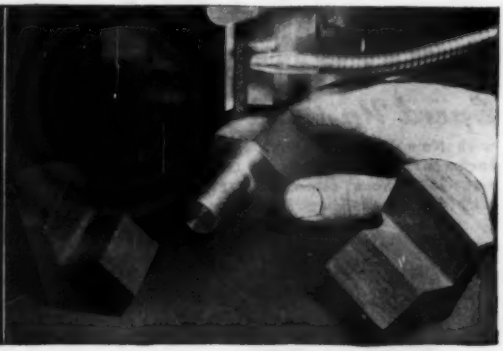

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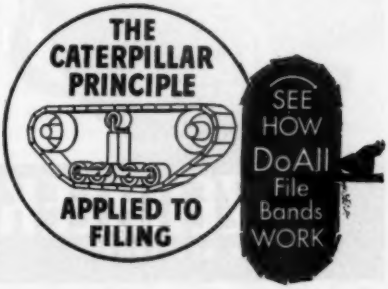

WYCO

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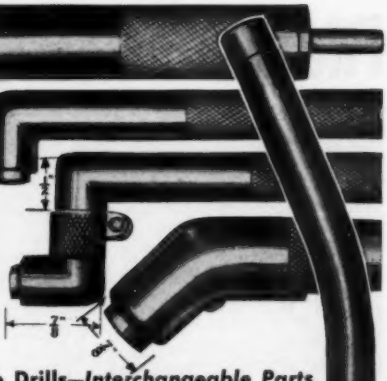

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WYCO Angle Drills—*Interchangeable Parts*

Welded steel tube housing, bronze head bearings and spindle bearings — WYCO construction assures a perfect alignment of the hardened gears, thus allowing for a minimum of upkeep and simple repairs. WYCO Drill Adapters are of solid hexagon steel threaded to fit the spindle, and centered to facilitate drilling to correct size. WYCO Angle Drills have *standardized interchangeable parts.*

1. Heat treated mitre gears
2. Annular ball bearings
3. Hardened drive spindle
4. Bronze head bearing
5. Bronze lower bearing
6. Locking ring
7. Hardened drill spindle
8. Steel end cap

(Wyco Angle Drills are made in two sizes — Universal Swivel Head, 90° and 45°. With Jacobs chuck if desired. Adapters to hold drills are made in three sizes.)

WYCO Flexible Shaft Machines

Most advanced in engineering design, WYCO Flexible Shaft Machines and WYCO Drilling Attachments are lower in price because of quantity production methods. Compare prices—we guarantee quality.

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WRITE FOR CATALOG

WYZENBEEK & STAFF, Inc.

838 844 W. HUBBARD ST. CHICAGO, ILLINOIS

The Foremanship Forum

By EDMUND MOTTERSHEAD

Part IV—Safety on the Working Front

IT is just before lunch time at American Arms Inc. Joe Smith reaches over to shut down his machine. As he does so, one of his buddies passes by and gives him a friendly slap on the back. Thrown off balance, Joe becomes tangled up in his machine and a moment later is lying on the floor, grease stained and twisted, a casualty on the working front. Men from adjoining machines stop to watch, crowding around curiously. The foreman comes over with the first aid attendant, carrying a stretcher. The crowd is shocked, filled with pity and a little uneasiness. Later they will begin to wonder about their own machines, what might happen to them. Who will take Joe Smith's place?

What did that careless slap on the back cost? One life, equivalent in statistical analysis to 6,000 man-days. There was a small bill for medical attention, but no hospital fees. Joe's family received compensation. The company was prompt and generous in the matter. So legal expenses were avoided, altho legal fees are often a large item in accidents. The machine was damaged, and it took time for a replacement part to come from the factory, which meant a stoppage of work at that station. As there was no material in the machine at the time nothing was damaged, but Joe had been doing 3 operations on a load of castings and had only completed the first one. This tied up production on the assembly line for a while. The other workers were a little excited over the occurrence, and gossiped about it for the better part of the afternoon. Production for about 15 men fell off measurably for almost a week, due to nervousness on their part. The man who had slapped Joe on the back felt so badly about it he couldn't work at all for a week and could only come back for half time for several weeks afterwards. He finally quit and had to be replaced. The new man who was eventually broken in to replace Joe, spoiled a number of the castings Joe had started working on, and took considerable time to get up to production.

The foreman and superintendent lost some time investigating the accident, settling the compensation claims of the family, straightening out the confusion among the workers, making the different reports required by their system, and breaking in a new man. The insurance company was persuaded not to raise its rates because of the accident; but the American Arms was warned for the last time about accident frequency. The reputation of the company was not made any better in the community, and the line-up at the employment window dwindled for several days.

The cost to Joe Smith was as high as it could be. Perhaps he might only have been injured and lost wages, or his health, or might have been permanently disabled and lost his skill.

Maybe that would have been cheaper, although statisticians say that loss of a leg or an arm means a loss of 4,500 man-days.

In 1941, the record was 50,000 workers dead, 3,970,000 maimed or hurt, 480,000,000 man-days of production lost. And Hitler might have smiled and hoped 1942 would be worse. The trend shows that it probably will be. National Safety Council recently published the accompanying table:

INDUSTRY'S RISING COST OF NEGLECT:

	YEAR	On-the-job Accidents	Off-job Accidents	TOTAL:
WORKERS KILLED	1940	17,000	27,000	44,000
	1941	18,000	32,000	50,000
WORKERS INJURED	1940	1,410,000	2,085,000	3,495,000
	1941	1,570,000	2,400,000	3,970,000
MAN-DAYS LOST	1940	170,000,000	250,000,000	420,000,000
	1942	180,000,000	300,000,000	48,000,000

Manufacturing industries had 30% more fatal accidents in 1941 than in the year before. The estimated cost due to wages lost, medical expenses and insurance overhead was approximately $850,000,000. Non-fatal injuries increased 14% in the same industries.

There are 2 other interesting facts:— reporting establishments in 7 major categories of war industries showed less favorable accident trends than other reporting groups. In 1941 the accident frequency rate in small plants was 37% higher than in large plants, and the severity rate was 11% higher than in the large plants.

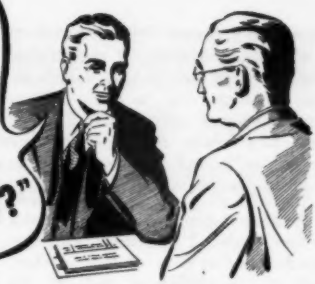
A foreman in a small sub-contracting plant in Illinois asks about the causes of accidents:— **"My boss is always talking safety, but when anyone points out that something should be done that will cost the company some money to help prevent accidents, he always replies that accidents will happen anyway, that three-fourths of them are due to careless workmen anyway, and that we should concentrate on getting the men to be careful. I wonder if you could give me some facts as to accident causes so that I can apply them to our problems here and have some evidence to show him."**

That employer's alibi is true only insofar as most industrial accidents are due to several causes, one of which is personal negligence of the worker's. It breaks down insofar as there are mechanical elements in the picture, and especially when one admits that the employer is responsible for proper selection, training and discipline of the workers, putting the right men on the right jobs, showing them the right way and the safe way of doing the jobs, and seeing to it that the workers perform accordingly.

Falls and falling objects still rank among the most prominent mankillers. Defective floors, congested floor space, flying material, improper handling and piling of materials, horseplay, over-exertion are also causes of accidents. Carelessness of the employee who does not use safety devices or obey safety rules on which he has received instruction, is another. Carelessness of the foreman in failing to instruct workers properly, in neglecting known hazards, in maintaining simple good shop housekeeping, in having any real enthusiam for safety promotion, contributes to the trouble. Carelessness of management in not taking action on known hazards is another.

National Safety Council, 20 North Wacker Drive, Chicago, has more and better information on the subject than any other single agency I know. A letter addressed to them stating your specific problems will bring prompt response and accurate information

"Where do you get the POTS for your FURNACES, Mr. Barstow?"



That question was recently asked of our Mr. W. G. Barstow by an executive of a large aviation manufacturer. Here are the facts:

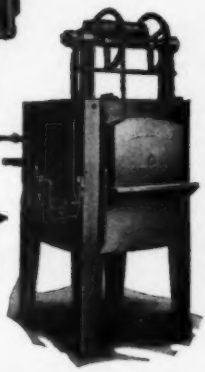
The pot in the particular MAHR furnace used by this manufacturer had been in operation for *six years* before it needed repair. After repair, it had been operating a year. The executive naturally considered that the pot was made of some wonderful material. Actually, it was made of ordinary boiler plate! The reason for its long life, as Mr. Barstow showed, is the unusually successful MAHR *method of firing*. In view of this incident, it would be trite to say this man appreciates the value of MAHR Furnaces.

For over a quarter century, MAHR has built furnaces on the premise that "there is NO substitute for quality and sound engineering". Perhaps, on occasion, a MAHR Furnace may cost a trifle more. But if the engineered performance-ability gives longer life and higher quality of production, a far greater additional cost would be well justified.

Ask us for the names of MAHR users over the years. Ask us also about the type of furnace YOU need. See the list of types in box. A MAHR Engineer can help you on any heat treating problem—wire, write or phone today.

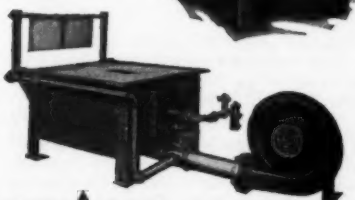
POT FURNACE

MAHR Standard Pot Furnace with hood for cyanide, etc. Made in many sizes and types for different work, including rectangular type for molten bath.



TOOL FURNACE

MAHR Standard Tool Furnace. Under fired to 1800° F. for regular tool steels. Over and under fired to 2600° F. for high speed tool steels.



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MAHR Open Top Smithing Forge with blower furnishing primary and secondary combustion air, and air for air curtains.

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MAHR Lead Pots in hard use in a large battery manufacturing company's plant.

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MAHR FURNACES FOR EVERY HEAT TREATING NEED

	Furnace Types:	*Other MAHR Equipment:*
Annealing	Car Bottom	Rivet Forges
Carburizing	Pit	Torches
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Hardening	Roller Hearth	Blowers
Forging	Continuous	Valves
Drawing	Pot	Smithing Forges
Stress Relief	Rotary	

along many lines. The Council made a study of 1,000 cases of permanent disabilities and deaths. It found 68% of the accidents due to a combination of both personal and mechanical causes; that 15% were traceable to personal causes only, and 17% traceable to mechanical causes alone.

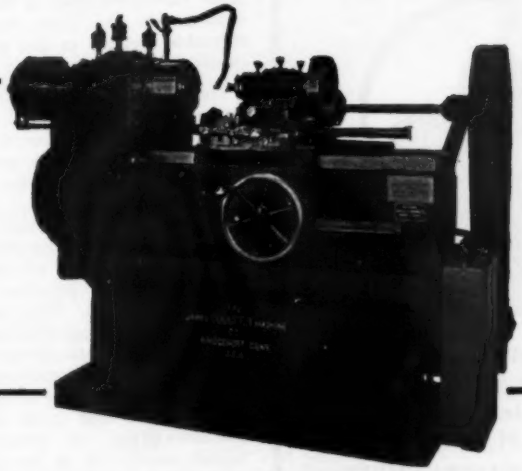
Personal causes were lumped together under 2 headings: improper attitude on the part of the worker, and lack of knowledge or skill on the job. Mechanical causes were divided into hazardous job set-ups, improper guarding of machines, defective agencies or equipment and unsafe apparel for the workers. The completed table breaking down the causes in their combinations shows that, when hazardous job set-up and lack of knowledge or skill on the part of the worker combine, 19% of the accidents occur—the largest single cause. Improper guarding of machines, together with improper attitude on the part of the worker accounted for 16%, the second greatest evil. The complete table is reproduced.

	No Personal Cause	Lack of Knowledge or Skill	Improper Attitude of Worker
	TOTALS 17%	35%	48%
No Mechanical Cause	15%	X	5%	10%
Unsafe Apparel	9%	1%	3%	5%
Defective Agencies	15%	7%	4%	4%
Improper Guarding	27%	7%	4%	16%
Hazardous Set-up	34%	2%	19%	13%

In the TOTALS column of the table are the percentages representing the frequency with which the various items are contributing causes. Five percent of the accidents resulted from lack of skill or knowledge of the job, without other contributing cause. Ten percent was due to the attitude of the worker, without any contributing mechanical cause. One percent was due to unsafe apparel, without any contributing personal cause. Seven percent was due to defective agencies, 7% due to improper guarding and 2% because of hazardous set-up, without any contributing personal causes. All the other percentages represent the relative frequency of various combinations of causes, arrived at by combining the mechanical and personal causes indicated. Of course, many of the accidents, no doubt, were due to more complicated combinations of causes. Hazardous set-up might have combined with improper guarding and unsafe apparel and lack of skill and attitude of the worker, for example. Only the chief causes are listed, but the picture indicates certainly where the major weak spots are to be found.

Whatever the accident cause examined might be, it should be noted that all have one thing in common:—they can be eliminated. Not with splint and bandage methods, but eliminated from the top of factory management down. Protective devices alone are not the answer. Far too many companies, in providing goggles, respirators, masks and what not, think that it ends their responsibility for the safety of the worker. The foreman or superintendent finds it hard to understand the man who neglects his goggles or his respirator, furnished to protect the worker from lethal dust and fumes. The boss would understand better if he himself had the discomfort of wearing them, and would look for a sound en-

Keep Ahead of DEFENSE DEMANDS *on the* PRODUCTION *of* EXTERNAL and INTERNAL THREADS



The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.

Send for Descriptive Bulletin giving full information.

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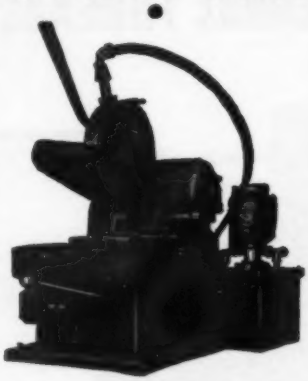
ABRASAW

BRIDGEPORT NO. 47W WET CUT-OFF MACHINE



More, better and cheaper cuts on practically all materials, are produced by the new Bridgeport "Abrasaw". Cutting speeds are unbelievably fast, material is handled with facility and the polished cuts often eliminate secondary operations.

LET US SEND BULLETIN GIVING DETAILS.

BRIDGEPORT SAFETY EMERY WHEEL CO. INC.

1304 W. BROAD ST. BRIDGEPORT, CONN.

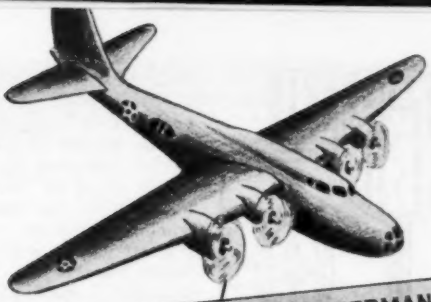
gineering change to eliminate the necessity of wearing such encumbrances. The chances are that he would increase production in doing so; for safety engineering and efficiency engineering usually are synonymous.

A newly appointed foreman in Indiana asks:—**"What is the best way to put over safety rules and regulations? I have just been put in charge of the department, and there has been considerable trouble in the past with accidents."**

The value of safety rules and regulations depends entirely upon what you do with them and about them. Simply preparing an elaborate set of rules is generally just offering the men an invitation to break them. Real safety should be an integral part of the process of introducing a worker to the job and instructing him on the job. Safe practices usually develop as the right way to do the job. They are commonly worked out for specific jobs right on the job. Safety should not be handled as an incidental after-thought. I think the first thing I would get across to men these days is that safety is not just a humane notion or something to be talked about. It is an absolute and patriotic essential in getting out maximum war production.

I was talking over this very question, a few weeks ago, with the head of one of the largest plants manufacturing farm implements. These days, of course, they are nearly 100% war production, running 3 shifts and really turning out the goods. As I walked into the plant and stopped at the reception desk by the guard, I noticed a stack of little safety booklets. So I picked one, and asked the man about it.

He told me that they have a Safety Department to carry out the all-plant safety program. This booklet of rules, for safety in the plant and on specific jobs, was prepared as an educational



LONDON · · · FLYING FORTRESSES BOMB GERMANY AGAIN · · ·

. . . and they all took off from this tiny block

Planes like the American Flying Fortresses just don't happen—it requires the combined efforts of designers, engineers and all sorts of technical men to conceive and construct planes of this type.

Yes, it requires highly skilled men to put these flying fortresses into the air, but it also requires the production of thousands of precision parts by both small and large companies before these planes can be manufactured on a production basis.

These plants, scattered over the entire country, are pouring finished parts into the assembly plants in an ever-increasing stream. There inspired men are working day and night moulding them into the finest aircraft in the world. What makes all this possible? —The Gage Block—standard of measure and the controlling factor in the manufacture of interchangeable precision parts.

Thus it is only natural that such particular attention is being paid in the acquiring of new standards. Are they reliable—durable—of high quality? It is the reason that today leading precision manufacturers throughout the United States, Canada and Great Britain are specifying Dearborn Gage Company's chromium plated gage blocks—standards with longer wearing millionths. They are available in three degrees of accuracy namely:

W	**—OR "WORKING SETS"**	"W" accuracy is a guaranteed tolerance of ± .000008 inch per inch or fraction thereof, of gage.
I	**—OR "INSPECTION SETS"**	"I" accuracy is a guaranteed tolerance of ± .000004 inch per inch or fraction thereof, of gage.
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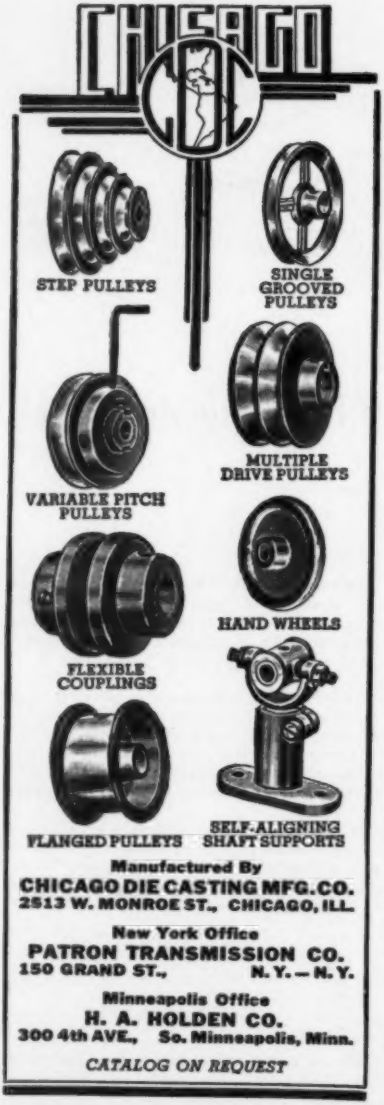
For prices on sets or individual blocks write for our new catalog today. Deliveries can be made within a reasonable time.

ORIGINATORS OF CHROMIUM PLATED GAGE BLOCKS

DEARBORN GAGE COMPANY 22033 · BEECH · STREET DEARBORN, MICHIGAN



device for the entire working force. The last page of the book is perforated to be torn out, and is a report by the worker to his foreman that the worker has read the book and understands all of it. The foreman in turn indicates on the slip his judgment of whether or not the worker understands the safety rules and turns it over to the Safety Department. The guard told me that use of this booklet had very definitely reduced accidents, and that the venture was considered a great success. He didn't mention the point, nor did I, but the thought stuck in my mind, that, whether or not the men read and understood the book, its use affords the foremen a tactful opportunity to hammer on safe practices to the men, point out specific hazards on particular jobs, and generally stimulate safety-consciousness. As a general plant policy, the book relieves the foreman of any onus of being a watchdog or a "fuss budget" on the subject, and still gives the full weight of his safety suggestions to the men. The other reason why I believe this booklet was such a success. . . . it was integrated in an all-plant program, a continuing effort to achieve safe working conditions and safe workers. It was not any sporadic flash-in-pan effort.

The booklet has in it several slogans such as: The best safety device is a careful man—A careless man is only an accident going some place to happen—A good wrench in your hand may save a bad wrench in your back. There are also several clever cartoons on specific points of safety. . . . .humorous but definitely to the point. The booklet is roughly divided into two sections . . . . general plant rules, and specific job rules.

General Plant Safety Rules

(1) Safety is insured by vigilance and watchfulness. Employees must not trust to the care excerised by others when their own safety is involved.

TO ALL OUR CUSTOMERS
WE SEND OUR HEARTIEST
SEASON'S GREETINGS
DON SHEPHARD, Pres. CLIFFORD C. STONE, Vice Pres.
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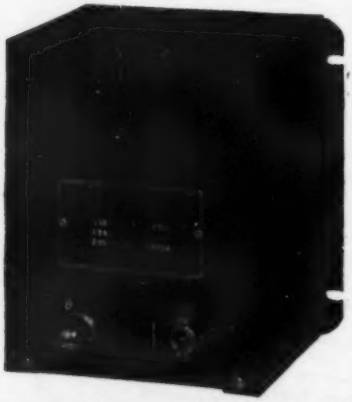
SPECIFICALLY DESIGNED FOR INDUSTRIAL USE—

Precisely engineered to meet increased demand for dependable rectifiers . . . In a range of 42 models—from 125 to 3000 watts capacity.

SIMPLE in operation. COMPACT—can be built directly into your equipment. Many other features.



With the NEW AUTOMATIC TIME DELAY SWITCH (in larger units) to protect rectifier tubes. A "money saver and production increaser—"prevents throwing the load on tubes until properly warmed up, etc.

NEW BULLETIN "61" gives complete information. WRITE for your copy.

ELECTRO-MATIC PRODUCTS CO.

Makers: NEUTROL Electric-magnetic Chuck Control

2235 NORTH KNOX AVE., CHICAGO, ILLINOIS

When in doubt always take the safe course. Think and act safely at all times.

(2) If injured, no matter how slightly, tell your foreman, and go at once to the plant hospital.

(3) Safety goggles or glasses must be worn in places where required. Employees having one eye must wear glasses with side screens at all times.

(4) Safety shoes should be worn by all shop employees.

(5) Notify your foreman, Safety Committeeman, or Safety Department when you see dangerous practices, defective floors, tools, ladders, machines, or other equipment which may cause injury.

(6) When working in areas of high dust or fume concentration wear a mask or respirator.

(7) Needless running in any part of the plant is prohibited.

(8) Do not try to lift or push objects which are too heavy for you. Ask for help when you need it. Learn to lift in the proper way to avoid strains. Bend your knees, keep your body erect, then push upward with your legs.

(9) Do not look at welding arcs. It may cause sore or burned eyes.

(10) Machine guards and safety decives must not be removed except for purposes of repair or adjustment, and must be replaced immediately before starting machines.

(11) The use of compressed air to clean clothes, benches, etc, or turning it up on yourself or anyone else is dangerous. Chips may fly or air may be forced into the body.

(12) Never distract or annoy another worker as it might cause an accident.

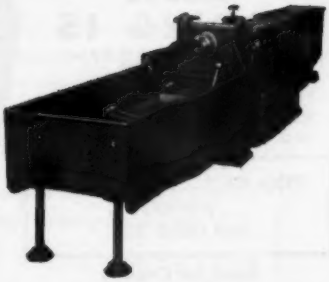
(13) Never use your hand or a rag to remove drillings or chips from a table or a machine. Use a brush or chip rod.

(14) All foundry employees should wear high shoes. Be sure you get properly fitted shoes.

HITTING THE PRODUCTION TARGET WITH BROACHING *the American Way!*

When a "Tin Fish" finds its mark it is neither by luck nor accident. A modern torpedo is a precision instrument of destruction.

The American standard H—6—48 horizontal hydraulic broaching machine shown to right is arranged for broaching a special formed keyway from bore in the flange at one end of cylindrical pressure chamber for torpedoes.



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ANN ARBOR, MICHIGAN, U.S.A.

BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY

Division of SUNDSTRAND MACHINE TOOL CO.

(15) Cleaning, oiling, adjusting or machinery or gaging work must not be done while machine is in motion.

(16) Wearing lose or torn clothing, neckties, or gloves around machinery is strictly forbidden.

(17) Finger rings must not be worn around machinery.

(18) Do not set in motion any machinery without being an authorized operator and first seeing that no one is in a position to be injured.

(19) Never attempt to enter or leave an elevator while it is in motion.

(20) Only authorized persons may enter a power house or a substation.

(21) Before doing any work, where there is danger of coming into contact with electrical wires or equipment, notify your foreman or the electrician. No one but an electrician should undertake any kind of work in connection with electrical equipment. Avoid touching any loose or misplaced electrical wires; consider them all dangerous.

(22) Keep your tools in good condition. Do not use tools with cracked or loose handles or mushroomed heads. Use properly fitted wrenches only.

(23) Never strike tempered steel with a hammer or other tool. Pieces are likely to fly.

(24) Pile material safely. Use proper blocking and never exceed a safe height.

(25) Do not place fingers or hands between dies or blades of machines while power is on. Use a hook, tongs, or other proper means to remove materials.

(26) When loads are carried overhead, always try to keep from under them.

(27) Do not take hold of crane or hoist cable just above sheave block as fingers may be drawn into block.

(28) Employees are prohibited from

Hundreds of Users Prefer

Tru-Cut TOOL BITS

where the

"GOING IS TOUGH"

Use Gold Tip and Blue Nose Bits on tough jobs like this and watch results.

CENTER DRILLS . . . KEYWAY CUTTERS . . . DOVETAILS . . . FORM GROUND TOOLS

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14236 Birwood, Detroit, Mich.

Specially treated to Rockwell "C" 62-65, and are not brittle.

Actual photo of Tru-Cut Gold Tip Bit. 1 1/16" cut, .020 Feed, 1020 SAE Steel.

LOGAN NO. 850 MANUFACTURING TURRET LATHE

SPECIFICATIONS: 1. Swing Over Bed, 10". 2. Bed Length, 43½". 3. Spindle Hole, 25/32". Capacity, ⅝". 4. Precision Ball Bearing Spindle Mounting. 5. Twelve Spindle Speeds, 38 to 1450 R.P.M. 6. Cross Slide Stroke, 3½". 7. Six Position, Automatic Indexing Turret. 8. Stroke of Turret, 4½".

Logan Speed Collet Chuck for the No. 850 Lathe or others with a 1½" x 8 thread spindle nose. Capacity ⅝" round bar stock. Quick acting. Positive squeeze grips. No keys or wrenches needed.

The LA-3 Tailstock Assembly and the LA-13 Compound Rest Assembly (below) will permit the No. 850 Turret Lathe to be used also as a standard screw cutting lathe. The Tailstock Assembly must be ordered with lathe as it must be matched with headstock at factory.

FOR CONTINUOUS PRODUCTION OF SMALL PARTS

This new Logan Lathe is the answer to war industry's demand for a fine, small production lathe, in order that larger machines may be released for heavier work. With a maximum capacity of ⅝" round bar stock, the No. 850 Logan Manufacturing Turret Lathe will turn out small parts with the same speed and accuracy as that of larger machines, and the investment is considerably less. Advanced design and engineering, combined with the same high quality standards that have characterized all Logan Lathes, are assurance of long and satisfactory service.

LOGAN ENGINEERING COMPANY • CHICAGO, ILLINOIS

Logan

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

riding on any lift, hook, chain or cable sling suspended from a crane, and from riding on any hand or lift truck.

(29) Many accidents are caused by improper use of cables, chains, hooks, ropes and blocks. These appliances should be inspected carefully and frequently. Under no circumstances should defective appliances be used.

(30) Before using any scaffold, platform, or ladder, see for **yourself** that it is safe.

(31) NO SMOKING and other safety signs must be strictly obeyed wherever posted.

(32) Order and cleanliness are important factors in preventing injuries, sickness and fire. Oily rags or waste must not be left lying around the plant. Put them in suitable closed cans. Keep corners, lockers, bench drawers and out-of-the-way places clean.

(33) When working in high places, from which falling is possible, use safety belts or other satisfactory safety guards.

(34) All openings in ground or floors should be guarded to prevent anyone falling into them.

(35) Fighting, wrestling, throwing anything, or "fooling" of any kind is forbidden.

(36) Many accidents are caused by leaving or placing materials or equipment in aisles, walkways or roads. This is especially bad for the night crews.

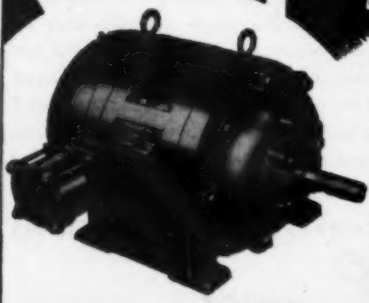
Keep such places clear.

(37) Know the locations of fire exits, alarm boxes, and fire fighting equipment in your department. Keep fire lanes and roads clear of material or obstructions.

(38) Piling material and equipment in front of or on top of fire apparatus, sprinkler valve houses, watchman's stations, electrical equipment, valves, etc. is forbidden.

LIMA

TOTALLY ENCLOSED
Explosion-proof
MOTORS



LIMA type REX Explosion-proof motors now available in NEMA frame sizes 224 and 225. These motors have the full approval of the Underwriters Laboratories for applications where combustible dusts, liquids or gases are present.

In addition LIMA also builds a complete line of polyphase AC motors in standard NEMA frames ½ to 75 hp brake test. Torque, Built-in and Special type motors also available. Write or wire today describing your needs.

PROMPT DELIVERY ON ORDERS

NEMA FRAMES 224 AND 225

THE LIMA ELECTRIC MOTOR COMPANY
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The New LIBERTY

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VERTICAL HIGH SPEED GRINDING ATTACHMENT

The NEW LIBERTY high speed grinding attachments are designed for quick simplified setups in order to maintain the best possible results in the tool room. They are excellent for grinding gages, angles, slots, recesses, and surfaces which are either impossible to get at with a large wheel or require difficult and expensive setups in which small wheels are a necessity.

Designed for the most accurate service in grinding tools and various kinds of mechanical equipment.

SEND FOR CIRCULAR GIVING FULL DETAILS.

Liberty TOOL AND GAGE WORKS

225 GEORGIA AVE. — PROVIDENCE, R. I.

(39) When your hands become soiled with paint, lead, or any chemical, be sure to wash them clean before eating.

(40) Lack of salt in the body may cause fatigue, cramps, and heat prostration. When you sweat excessively, you lose salt from your body. Salt tablets are furnished and should be taken as needed with a drink of water.

WATER removed from AIRLINES AUTOMATICALLY
WITH THE
MURPHY SEPARATOR

Sizes ½" to 4" Pipe
Literature and Prices on request.
RESULTS — — — — GUARANTEED
NO ABSORBENTS — NO CHEMICALS
JAS. A. MURPHY & CO.
HAMILTON, OHIO

See your foreman or the Nurse about the number to be taken.

Drill Presses

(1) Never wear long sleeves. Roll them up or wear a safety sleeve.

(2) Do not hold material in hands while drilling. If you have no jig for the job, fasten work to the table with a clamp.

(3) Never wear gloves while operating a drill press, unless permission has been given for specific jobs by the Safety Department or Foreman.

Grinding Machines

(1) Always wear goggles or a face shield.

(2) Never use a grinding wheel that vibrates or is not running true.

(3) Abrasive sheets on disc grinders must be replaced before they become frayed or torn.

(4) Have the rest properly adjusted close to wheel.

Power Presses

(1) Operators must not place hands between the die sections on the press.

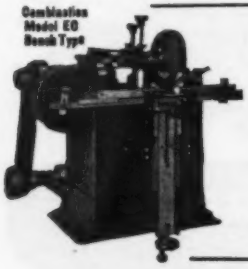
(2) Do not leave your press running unattended.

(3) If you encounter clutch or other mechanical trouble, report it to your foreman at once.

(4) Never attempt to set up or adjust a punch press until power has been shut off.

Lathes And Screw Machines

(1) Always stop machine before changing position of tools in tool post.



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HACK, BAND, CIRCULAR SAWS
The WARDWELL SAV-A-SAW automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.
Write for complete information
THE WARDWELL MFG. CO.
3165 FULTON RD. • CLEVELAND, OHIO

60-CYCLE GRINDER MAINTAINS SPEED UNDER LOAD

POWER AND LIGHT WEIGHT distinguish the 60-cycle squirrel cage induction type motor of CP-460 Grinders and Sanders and insure high sustained speed under all degrees of grinding loads encountered in general purpose grinding and sanding.

NEW CP TOOL COMPARES WITH HICYCLE GRINDERS IN EFFICIENCY AND ECONOMY

Low Maintenance — No Armatures, Commutators, Brushes

NEW YORK (CP)—Ideal for plants whose operations do not warrant the installation of high frequency tools—or plants that do have such tools but lack the high frequency power lines at points where additional tools could be advantageously used, the new CP-460 Grinders and Sanders afford fast, uniform grinding and sanding. These tools have a powerful, efficient, light-weight induction motor of the same type as the well-known CP Hicycle Grinders but operate on 60-cycle, 3-phase, 220-volt A.C. circuits. This motor insures high sustained speed under load.

The absence of commutators, brushes, brush holders, armatures, etc. and use of a special sturdily constructed rotor with low slip characteristic, provide heavy-duty production tools that are considerably lower in maintenance cost than the universal type of grinders and sanders. Write for complete details.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 E. 44th St., New York, N. Y.

COOL-RUNNING MOTOR at all load speeds is assured by the coordinated ventilating system incorporated in CP-460 Grinders. Large intake and exhaust holes and efficient fan insure ample airflow for effective cooling.

NO ABRASIVE DUST can injure coil insulation of the new CP-460 Grinders and Sanders, due to rubber-covered stator winding and positive seal of vital parts.

STRONG, SILENT HELICAL GEARS throughout (spiral bevel gearing on the right angle tools), with ball bearings of felt seal type, mounted on steel inserts cast integral, assure long-time service from CP-460 Grinders and Sanders.

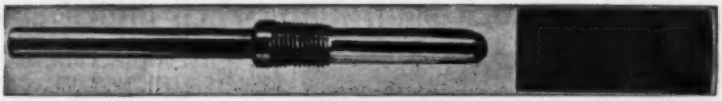
CHICAGO PNEUMATIC

ELECTRIC TOOLS

ALSO: Air Compressors, Pneumatic Tools, Hydraulic Aviation Accessories, Diesel Engines, Rock Drills

HICYCLE and UNIVERSAL Drills, Reamers, Nut Runners, Screw Drivers, Grinders, Sanders, Tappers

FLEXIBLE ABRASIVE WHEELS



Designed for precision work where flexibility is required, these wheels are useful accessories for sanding and finishing regular and irregular jobs, penetrating into difficult recesses, lapping holes in dies, finishing various shapes of metal, wood, rubber and plastic parts.

Useful for finishing propellers in aircraft construction. Descriptive bulletin and sample wheel will be sent on request. Prompt Deliveries.

FIELD ABRASIVE SPECIALTY MFG. CO. 203 LOWE BLDG., DAYTON, OHIO

(2) When doing filing work at a lathe, file left handed with the right hand across the stock. This will keep both hands and arms away from the chuck. Do not hold the file directly in front, where the file handle could be forced back against the body if caught.

Cranemen

(1) Learn the crane rules and abide by them. Be sure you understand the crane mechanism and its care. If adjustments or repairs are necessary, report them at once to foreman or Maintenance Department.

(2) Do not close the main switch when you find it open, until you have first made sure that no one is on or about the crane.

(3) Carry loads around men and not over them whenever possible. Report men who will not keep from under loads.

(4) Make sure the load being lifted is under control at all times.

Floormen—(Any person hooking crane load.)

(1) Be sure to give the operator clear signals.

(2) Before allowing the cranemen to hoist, see that trolley is directly over the load to avoid swinging.

(3) See that the load is free of all loose material before being hoisted.

(4) Report all slings, chains, hitches and hoisting accessories when they need repair or replacement.

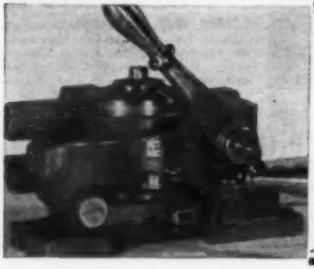
(5) Be sure all loads are hooked in the safest manner before giving the hoist signal.

Hand Tools

(1) Tools with mushroomed or broken heads, or with split or loose handles should never be used.

(2) Never use files with handles missing, or with the teeth dull or filled up.

(3) Never carry sharp or pointed tools in your pockets.



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NEW Dearborn Automatic Chucking and Indexing Fixture

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

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with Hot-Rolled Stock?

Try SUTTON
FULL-FLOATING
Style F COLLETS
WITH
INTERCHANGEABLE
REPLACEABLE JAWS

and PATENTED DIAMOND SERRATIONS
Grip Tighter • Self-Cleaning

One Master Per Machine
An assortment of jaws will cover your range of work, round, hex and square, up to machine capacity.

Jaws Quickly and Easily Changed
Setup man does not remove master from the tube. This saves time.

Full Bearing—True Running
Each jaw floats independently, comes to full bearing on stock, and allows collet to run as true as the machine spindle.

Lower Tool Cost
Diamond serrations take horizontal and rotating thrusts *at an angle*, giving full grip with *one-third less* locking tension and increasing life of machine parts. Dirt, scale and chips work out *easily* through *diamond* serrations, reducing wear on jaws.

Collets • Feeders
Master Collets and Pads
Master Feeders and Pads
Parts and Accessories
for lathes, milling machines, hand and automatic screw machines.

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SUTTON Diamond Grip **COLLETS**

PADDOCK
Ball Bearing
BANDSAW
GUIDES

•

Reduce Blade Breakage
Increase Production

Easily adjusted to all sizes of blades to 1½" wide.

Recommended for new and old machines running at any speed cutting all materials.

Shipped on 10 day approval

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New Britain
UNIVERSAL VISE

Swivels 360 degrees horizontally, 100 degrees vertically, to give any angle or compound of angles.

Write for Further Information.

NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.

(4) When using knives, pliers, or wrenches etc., do not place the strain towards yourself.

(5) Use the tools **only** for the purpose for which they were designed.

(6) Do not use wrenches with worn or sprung jaws.

Factory Maintenance

(1) After making repairs or adjustments on any machine, be sure that all guards are replaced before leaving.

(2) When working on machinery or line shafts, be sure to lock the power switch so that no one may turn on the power until you are in the clear.

Not long ago I was discussing the general problem of plant safety with the superintendent of a plant which has more than doubled its personnel in war production expansion. The "super" asked me:—"**Can accidents really be eliminated? We are getting such a large number of workers who are new to the jobs, who have never had industrial experience before, men who have been rejected by the army and are physically deficient or incapable. We find among these people such a large degree of apparent indifference or carelessness, that we are wondering what we can do to reduce the frequency and severity of accidents.**

For the most part, they can be eliminated, yes! That, at least, must be the attitude and determination. War calls for increased production which means increased hazards, but the record of most of the larger plants in this regard has been very good indeed. Numerous large plants with well established safety programs have taken war conversion and expansion in stride. Some of them even boast that their accident rates are lower than in peace time.

One great prerequisite to reducing accidents in your plant is management's desire to do so. The means of accomplishing the job are at hand in many places. The U. S. Department of Labor, the National Safety Council, various

ONLY

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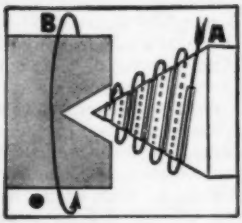
Helical Groove CENTERS



* The *exclusive* left-hand helical groove constantly conveys supply of oil to the extreme point of the center and holds a reserve supply of lubricant. Since the lubricant flows to the bearing surface in the same direction (see A above) as that in which the work is turning (see B), the capillary action draws the lubricant into the work.

CMD CENTER POINT LUBRICANT

can withstand pressures greater than 50,000 lbs. per square inch. Try it once! You'll use it regularly!

GIVE YOU ALL OF THESE COST-REDUCING ADVANTAGES

• **GREATER MACHINE OUTPUT** The advanced design* of CMD Helical Groove Centers assures *more complete* and *longer-lasting lubrication* of point and work. No more burned-out center-points! No stopping machine to relubricate center! No readjustments of tail stock!

• **RIGIDITY FOR PRECISION WORK** Because CMD Helical Groove Centers do *not* turn with the work, there are no rollers, balls, or races to wear out and throw the support for work out of alignment. The work turns on a film of oil, which is constantly replenished from the supply in the helical groove.

• **LESS POWER CONSUMPTION** By reducing frictional heat to the minimum, CMD Helical Groove Centers prevent excessive expansion of work (a common cause of high power costs). The lubricant on work and in groove also helps to expel heat generated by cutting tools.

Write for FREE *Sample Kit*

CHICAGO MANUFACTURING & DISTRIBUTING COMPANY
Dept. 10-BB, 1928 West 46th St., Chicago, Ill.

☐ Send circular on CMD Helical Groove Centers

☐ Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT LUBRICANT and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

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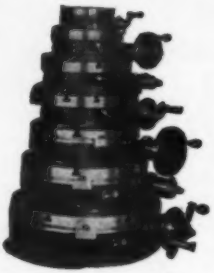
TROYKE ROTARY TABLES



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ALFRED A. TROYKE

4422 Appleton St., Cincinnati, O.

trade associations and insurance companies have 10-point, 30-point or 50-point programs which you can use. Or you can work out your own, adapting from others what you feel will best apply in your own plant.

Safety programs are based essentially on 3 factors:—education, enforcement, and engineering .

Often it is very difficult to educate workers to the value of preserving their own hides. Green men are often heedless of danger. But old timers are often worse, clinging to bad work habits and to over-confidence in their skill in handling jobs. Sand blasters, for example, have been known to refuse to wear air-conditioned helmets because it interfered with their chewing tobacco.

On your part, as top management, it takes downright determination sometimes, to enforce safety rules. Except in the smaller plants, the foreman is responsible for the workers' obedience to rules. His powers to enforce them range from discipling to discharge, but the common penalty is "docking." In the face of manpower shortages, especially at critical work stations in the plant, to send a man away for 15 or 20 hours is sometimes difficult. But 6 or 8 such penalties will work wonders. I know a foreman in a piece-rate department who makes the workers stand idle beside shut-down machines for half an hour for every violation. That annoys the workers no end. But, as he also carefully points out why it is done, and indicates that it will happen every time he finds another violation, the men soon work safely. The fine of lost time on piece rate work is felt deeply enough to get results, even tho it is temporarily costly to plant production.

Sometimes safety engineering can be as simple as efficient painting. Three dimensional painting has been used effectively in many plants to highlight electric wiring and power, moving parts

GOOD NEWS!

for DIE MAKERS

Transfer Points Eliminate Guesswork in Die Making

There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in ¼" to 1" diameters.

3/16"	$1.50 per set	5/16"	$1.25 per set	7/16"	$1.40 per set
1/4"	1.20 " "	3/8"	1.35 " "	1/2"	1.50 " "

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KUM-KLEEN STICKERS
with their magic adhesive backing
HELP SPEED PRODUCTION!
Only magic Kum-Kleen stickers:
✔ are applied without moistening
✔ are easily peeled off without leaving a trace
✔ yet never pop off
✔ adhere to any smooth surface including plastics, metal, glass, wood, varnish, and lacquer.
SEND FOR SAMPLES & CATALOG TODAY!
REJECTED
This item has been CHARGED OUT
SCRAP
LAY OUT
Kum·Kleen STICKERS
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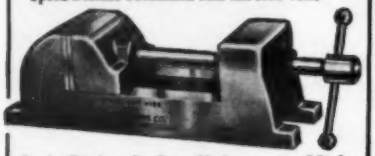
DOUBLE YOUR DRILL PRESS CAPACITY
Minutes are Seconds with the new TWISTITE Vise.
Opens to full capacity in one second.
Speed Defense Production with this New Vise.



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Machine Tool Coolant Pumps?
Made in four types; 1/30 and 1/10 h. p. for small machine tools and machines requiring from 4 to 10 G. P. M.
Write for descriptive literature.
The Ruthman Machinery Co.
1819 Reading Rd., Cincinnati, Ohio

of machines, etc. Production methods on boat building have been reversed for speed and also for safety. Employee-participation in safety programs will often bring to light practical suggestions which result in engineering changes that not only increase safety but speed production.

Safety has suffered in many plants from a sentimental approach, whereas, **safety is essentially a production problem.** Management may no longer feel that the statement—"unsafe practices by workers will not be tolerated", or the handling of safety programs as public relations measures along with employee picnics, is either sufficient precaution or straight thinking. Manpower losses produce a block to production which is difficult to remedy. Safety today is a continuous job which is not only "good business" but absolutely necessary. Planning for safety may be an all-staff job. The design and installation of safety equipment is definitely a job for a specialized safety engineer, but making safety effective is a large part of the job of the foreman and supervisors.

It is up to them to see that safety rules are observed.

One thing the plant should do, is to give all accidents full publicity, possibly by using colored lights, by using daily or weekly bulletins reporting accidents to every member of the personnel. One plant adopted the city system of marking a large yellow "X" on the spot where a fatal accident occurred. Safety flags, propaganda posters in prominent places, a system of rewarding employees and departments for good performance can be used. Management should strive to get closer cooperation between itself and the foremen in putting over the safety program, either thru definite safety conferences, held at periodic intervals, or thru some such device as a plant safety

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MEAD BANDSANDER
It is a time, labor and money saver on innumerable jobs in any shop. Sharpens tools, cutters, etc., of many "kinds". F. O. B. Chicago, $14.95.
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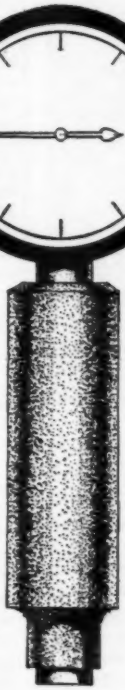
TRITON



The fundamental basis of all war production is precision and speed.

Substitute your flush pin gauges, snap height gauges, etc. for special dial indicator gauges. They are:

MANY TIMES FASTER IN OPERATION.

NEVER WEAR OUT.

MAKE NO MISTAKES IN READING.

We will design special dial indicator gauges to meet your requirements.

Write and tell us your problem—we might have the solution.

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RING GAUGES
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The
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Jansson Gage Blocks—a good standard for precision measurement. Used by leading armaments manufacturers. Preferred by experienced inspectors for their extreme accuracy.
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council. Departmental competition is also used with good effect. But a competitive system involves danger of making foreman and workers strive for the record instead of the safety. It can mean failure to report accidents rather than accident prevention.

Group meetings between shifts to educate the workers are also effective, especially if keyed to specific jobs and operations and their hazards. And don't forget experience has shown conclusively that it is seldom the dangerous job that kills the man. The most dangerous jobs are safeguarded, and the workers usually excercise considerable caution. Falling into holes, or stumbling over litter on the floor, or lifting too much weight and other common accidents are the ones which must be guarded against continuously. They're the ones which require the greatest attention in the educational effort.

The foreman's duties in promoting safety are constant and numerous. To the foreman who is giving the matter serious consideration for the first time, I would suggest, as a beginning step, that he itemize the hazards that exist in his department, leaving a blank space to indicate upon further inventory, the way in which the hazards are met. Just to suggest a few of the hundreds that are possible, check over the chain hoists, ladders, machine feeds, transportation trucks, floor congestion, material piling, belts, line shafts, pulleys, grinders, imflammables, lighting, condition of hand tools, scaffolding—you make the list.

The second most important duty of the foreman is instructive—making sure that each worker is thoroughly familiar with the hazards on each job he has to perform, and that he knows the correct and safe way to do that job. Personally, the foreman should have a sound belief in the value of safety promotion, and the courage to enforce adherance to safe practices. He should also have a receptive attitude towards safety suggestions, coming either from the workers themselves or from top management. Above all, he should set a good example in obeying safety rules and in cooperating with the safety committee and with management in making the effort successful.

Remember, accidents don't just happen—they are caused! And they can be eliminated—if you are sufficiently serious about eliminating them to do something about it today, and tomorrow, and every day.

"KEEP 'EM ROLLING"

Buy U. S. War Savings Bonds and Stamps

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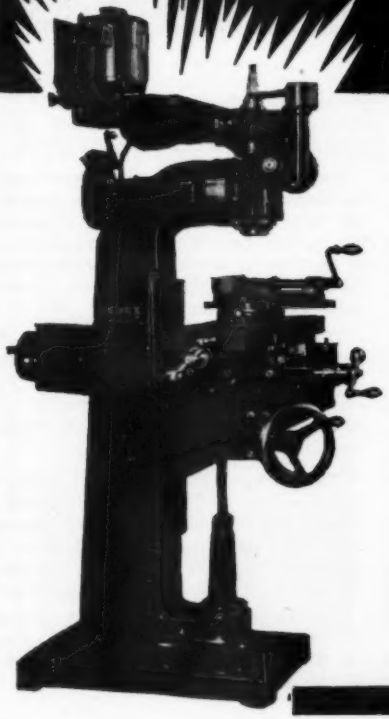
With

Vernier Precision

FOR MILLING, DRILLING AND BORING ON TOOLS, DIES, EXPERIMENTAL AND PRODUCTION WORK



Constant pounding, twenty-four hours a day, seven days a week has been the task of hundreds of INDEX MILLS and they are doing the job so well that a large percentage of our orders are repeats.

If you do not know about this remarkable machine made by INDEX you should write today to

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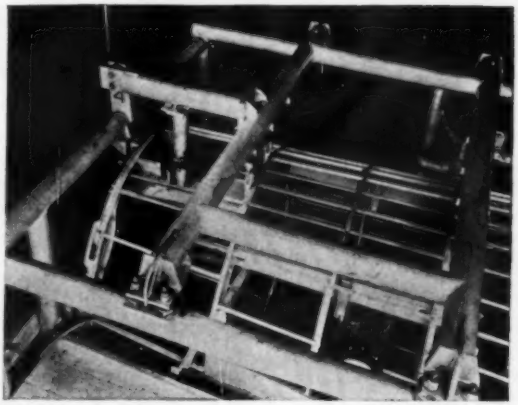
Arc Welded Jigs and Fixtures Cut Costs



ILLUSTRATED are jigs and fixtures, which were redesigned for welded construction and described in a paper which won the author, H. V. Wenger, Jr., senior tool engineer, Boeing Aircraft Co., Seattle, Wash., an award of $500 in the 2½-year $200,000 welding study program sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.

Design of jigs and fixtures permitted elimination of machining in their construction. These fixtures are used in aircraft manufacturing. New methods have been designed to replace machinery. Arc welding plays an important part in this.

For instance, the cost of a typical Bulkhead Assembly jig, by the old construction $456, representing a saving of $240 or 35%.

"Saving time", says the author, "is much more important in this emergency than money".

Mr. Wenger is a graduate of Purdue University.

The Lincoln Foundation $200,000 Progress Award Program, results of which were announced in October, showed a possible annual cost saving of $1,825,000,000 including 7,000,000 tons of steel valued at $271,000,000 and 153,000,000 man-hours of labor available by utilization of arc welding.

Papers were submitted from 46 of the 48 states by engineers, designers, architects, maintenance men and executives thruout the industrial field.

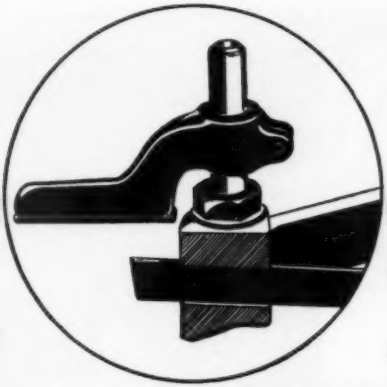
Altogther, 408 awards were made to 458 recipients, the difference covering joint authorship. Awards embraced 46 divisions of participation, which encompassed the entire industrial field.

The great mass of important new welding data contained in the papers will be made available as soon as possible for the benefit of war industries—in the firm of articles in trade publications and other magazines and eventually in book form.

This was done at the conclusion of the last Foundation study in 1937-38, and resulted in the dissemination of information which became vital in the nation's war production, utilizing welding.

The book, "Arc Welding in Design, Manufacture and Construction", containing 109 of the outstanding papers from the first program, has become a standard reference guide for application of arc welding to war production.

The Foundation was founded in 1936 in honor of James F. Lincoln, President of The Lincoln Electric Co., by the board of directors.



THE TOOL **HOLDER** WITH A **STEADY-REST**

WORKS **PERFECTLY** ON **POWER CROSS-FEED**

Simplifies Cutting-Off In Lathe !

You'll get the surprise of your life when you change over to the Lombard Tool Holder for cutting-off in a lathe —because this new-type tool holder eliminates entirely the tendency of the stock to jump, or lift, or climb on the tool.

The secret lies in the Lombard's exclusive feature called a "STEADY-REST"—a sturdy bar that rides over the work, holding the work down so that the tool cuts smoothly through the stock—as smoothly as a butcher knife cutting through cheese.

Quickly Pays for Itself !

By making it impossible for the tool to chatter or dig into the stock, the Lombard Tool Holder eliminates both tool-breakage and stock-spoilage. These two big savings pay for the holder in a surprisingly short time.

PRICES

Extra Heavy Duty Models

For 12' to 14' Lathe..... **$16.75**

•

For 16' to 18' Lathe..... **$17.75**

ORDER DIRECT!

•

Money-back Guarantee

LOMBARD MANUFACTURING CO.

16217 Linwood Ave. Detroit, Mich.

Fluorescent Lighting for High Mounting Heights

Fig. 1—Harsh shadows are eliminated by high bay fluorescent lighting in this machine shop. The lamps are well shielded, and the ceiling is illuminated by diffuser type reflectors. (Westinghouse Photo).

The shop interior illustrated (Fig. 1) is a typical example of Westinghouse fluorescent luminaires with two 100 watt lamps mounted 28 feet above the floor. The diagram (Fig. 2) shows a typical bay layout and gives the initial footcandle values obtained 3 feet above the floor. It is expected that normal depreciation on this installation will be about 30 per cent.

This installation has several outstanding features. Diffused fluorescent light provides very comfortable illumination, free from direct or reflected glare. Shadows are soft, and high vertical footcandles illuminate the interior of deep cavities in electrical machinery. The light is uniformly distributed, properly illuminating areas close to walls and in corners. Crane lights are unnecessary because wide spread illumination provides sufficient light beneath the crane to eliminate the usual sharp shadows. The high quality of the light gives excellent visibility for reading micrometers and gauges.

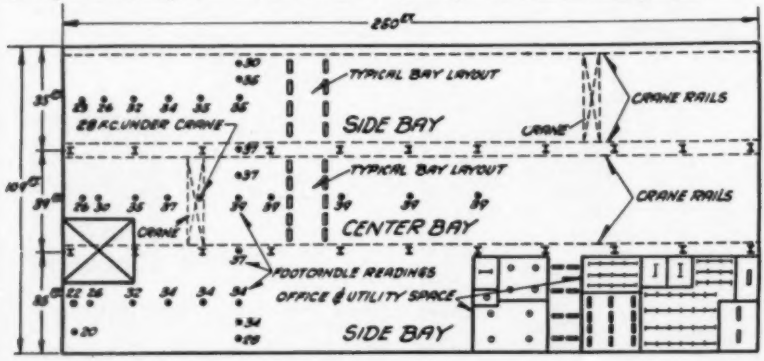


Fig. 2—Illumination of 34 foot candles is provided by 228 Westinghouse wide angle diffusers with two 100-watt white fluorescent lamps in this machine shop. Luminaires are mounted 28 feet above the floor.

SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

1. Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
2. Saves time and expense of drawing or tempering small metal parts in large furnaces.
3. Cuts handling time when normalizing or annealing small parts. No waiting.
4. Conveniently available for pre-heating for subsequent high-speed hardening.
5. Eliminates shut downs and delays in servicing emergency repair orders.

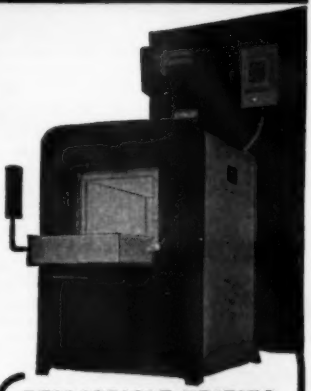
AVAILABLE IN TWO SIZES

Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
MH-3	8″W 6″H 14″L	29.6	3400	14.8	$124.00*
MH-4	10″W 6″H 18″L	....	4800	20.9	$191.00*

**Includes Hearth Plate*

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$142.40.



REPLACEABLE HEATING ELEMENTS—Replaceable nickel chromium resistors embedded in rectangular refactory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel—furnace structure remains undisturbed.

FREE Complete data covering specifications, additional applications and ordering instructions are included in this new folder. Write for your copy today. Ask for Bulletin No. 50.

COOLEY ELECTRIC MANUFACTURING CORP.
213 S. SENATE AVENUE • INDIANAPOLIS, IND.

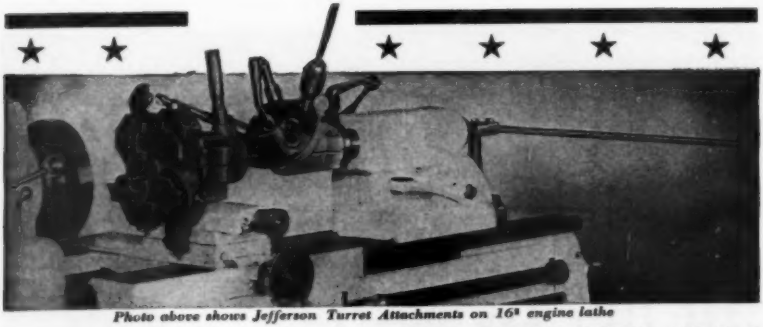
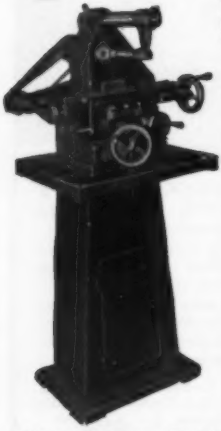
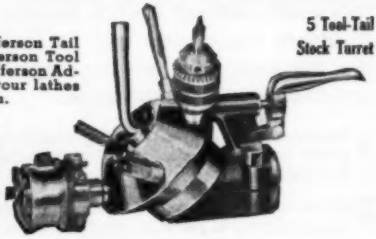


Photo above shows Jefferson Turret Attachments on 16" engine lathe

Convert YOUR ENGINE LATHE INTO A TURRET LATHE IN 15 SECONDS



Simply attach the Jefferson Tail Stock Turret, the Jefferson Tool Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in illustration.



5 Tool-Tail Stock Turret

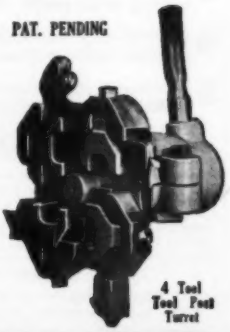
With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe or changing tools. The JEFFERSON TURRETS are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24" swing.

DELIVERY 6 DAYS

PAT. PENDING

5-Tool Tail-Stock Turret accommodates five tools and each tool centers automatically when brought into position by means of an indexing plunger. Made in four sizes to fit small bench lathes up to lathes with 24" swing.

4-Tool Tool-Post Turret carries four separate tools instead of one. Made in two sizes for standard 0, 00, No. 1 and No. 2 tool holders.



4 Tool Tool Post Turret

JEFFERSON BULL DOG PRECISION MILLING MACHINES

Obtainable Floor or Bench Type Power Feed. Capable of close tolerances on die sinking, contour profiling, angular milling, jig boring routing of ferrous, non-ferrous metals, fibre and plastics for production line or tool-room. V-belt drive.

Write for further details, also literature on the Jefferson Precision Milling Machine, Milling Machine Dividing Heads, Vises, Swing Frame Grinder, Endless Belt Sander, Foundry Riddle.

JEFFERSON MACHINE TOOL CO.

700 W. FOURTH ST., CINCINNATI, OHIO

"Let's Talk Shop!"

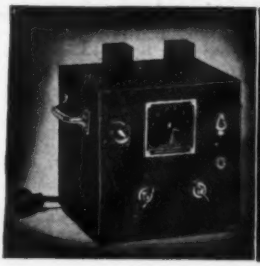
Have You Considered Tubing?

By John E. Hyler

SINCE tubing is highly versatile industrial material, management is continually on the lookout for new ways to use it to advantage, and also is alert for methods of working it and handling it to better advantage. In the very beginning of processing, where small-diameter tubing is used in short lengths and large amounts, the problem arises of cutting off those lengths with the greatest economy. One of the modern metal-cutting bandsaws, carrying a high-quality fine-toothed blade, has made a remarkable showing in this respect, by using in connection with the machine a nesting fixture which holds as many as 50 pieces of tubing firmly and rigidly together as one unit for cutting. This of course means that 50 pieces are produced at each cut. It can be seen readily that this makes for real production.

Have you ever thought of the possibilities inherent in forging tubing into shapes other than round? I have heard of one case in which tube sections were forged to square shape and then used as spring buckles. Doubtless there are possibilities along this line that are overlooked in many plants, with the result that some more costly and less satisfactory method is adopted. Consider, as a case in point, welded structures, and the difficulties of cutting round tubing so it will fit together properly for welding, especially when it comes together at angles other than square. By forging the ends of a piece of tubing into square form first, cutting it for welding joinery is very much simplified, and if it be properly done, the looks of the finished structure will be improved because of the smooth fitting joints made possible in this manner.

An interesting variant of forging processes for changing the shape of tubing, is found in a process that has been employed now and then for making a piece of tubing round thru-out its length, but of variable diameter, incorporating swells or depressions where it seems advisable. This is done in a lathe-type machine, the tube to be worked being mounted on a formed mandrel, and forced to turn with the

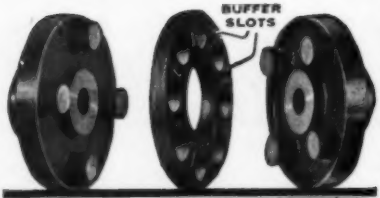


Red "E" DEMAGNETIZERS & ETCHERS FOR SPEED AND ECONOMY

A sturdy all around unit for any shop. Demagnetizes by throwing lower switch and passing work over magnetic poles at top of unit. Etching is controlled at upper switch with convenient six station selector to adjust depth of etch.

Red indicator light signals when unit is in operation. Rubber extension cord, plug, special alloy etching stylus with self cooling holder are included. *Write for folder giving details.*

GRINDING MACHINE CO.
2832 E. GRAND BLVD. DETROIT, MICH



A MONEY SAVER

The BUFFER-SLOT COUPLING lengthens the life of your Motor-Driven Machines by absorbing the load shock and constant vibration that gradually wear out machinery and bring on shutdowns and repairs.

BUFFER-SLOT COUPLING

It not only gives you all the advantages of the ordinary Flexible Coupling but it goes a step further and restores that cushion driving torque lost when you discarded Belt Drives. It is long lived, dependable and especially adapted for use with machinery having Ball or Babbitt Bearings.

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Lead screw ground from the solid AFTER hardening

CRITERION Boring Head

SMOOTH and compact. Constant accuracy. Parts subject to wear are hardened. Large offset adjustment eliminates need for offset boring bars. Lead screw is hardened tool steel. Its threads are ground from the solid AFTER hardening.
Criterion heads are unexcelled in accuracy, in ability to withstand constant use. Two sizes 1½" and 3". ¾" and 1" bar capacity. Order from your dealer or write direct. Request free literature. No obligation.

CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

mandrel by drilling a hole thru both and locking them together with a pin. A special type of ball-bearing roller, embracing the circumference of the tubing, and moved along laterally as it turns, is so designed that the balls may be forced inward by means of a lever which operates a 2-part V-race, to roll the tube down to the lesser diameters incorporated in the mandrel. It will, of course, be appreciated that the mandrel must either reduce in size progressively from one end to the other, or it must feature collapsibility, in order that it may be removed from the formed tube readily.

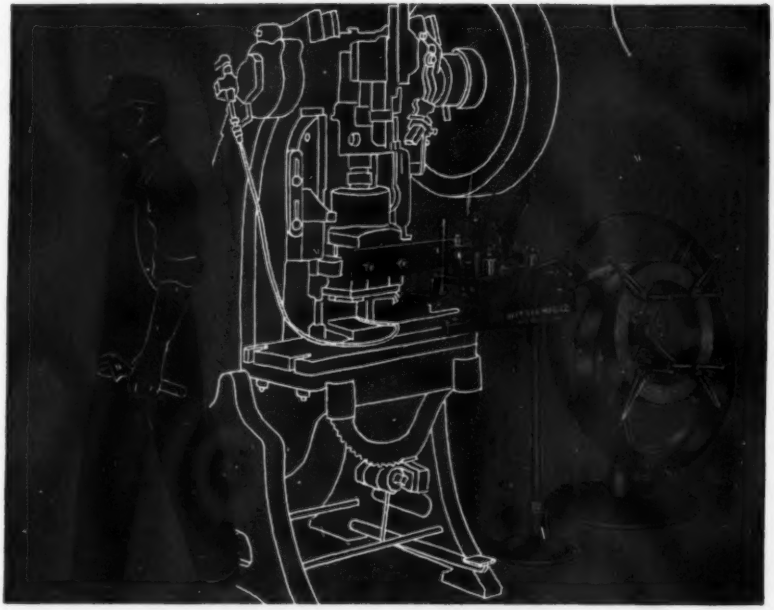
The ability to form tubing from various materials kept in the shop in strip form, such as copper, zinc, brass, aluminum or stainless steel, is a decided shop asset in a great many cases. This is done by some, thru the use of a special roll-forming machine, tho it should be noted that the same type of forming machine will produce many other sections than tubing. It is possible to roll materials to form on a machine of this kind at speeds which vary from 100 to 600 feet per minute.

Copper tubing in small diameters finds many industrial uses, varying from feed lines for automobiles to unit heaters and refrigerators. Coming in coils, this material must be straightened and cut to measured lengths, and to do this job on a production basis, it is needful to have a mechanical method that will eliminate the human element as far as possible. One method used contemplates starting the end of a coil of copper tubing into the rolls of a machine designed for the purpose, which, feeding the material thru the machine, straightens it, and cuts it off in equal lengths of whatever dimension the machine has been set for. Operation varies from 20 to 30 feet per minute, depending upon the length of the material required.

WAR PRODUCTION *rolls out faster with*

WITTEK *Automatic*

ROLL FEEDS AND REEL STANDS



The major problem confronting industry today is increased war production. Manufacturers of metal stampings must recognize automatic feeding of coiled strip stock to punch presses as vital to the solution of their problem.

Wittek Automatic Roll Feeds and Reel Stands are designed and built by engineers with years of experience to guide them. With Wittek you can conserve man-hours and maintain new high production schedules.

Write for Descriptive Catalog

WITTEK MANUFACTURING CO., 4305-15 W. 24th Pl., Chicago, Ill.

SPEED UP TOOLING—
CUT
COSTS

with the
UNIVERSAL
VISE

Save tooling time. Build your fixtures around a completely pre-designed drill jig body.

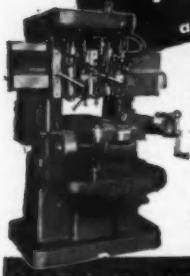
Save production costs. Savings up to 60% in drilling time not uncommon. Lever locks work instantly—holds securely. Throw it back and work is released. No complicated adjustments. Save cost of expensive drill fixtures—just a bushing plate and adaptor needed for each job.

Order today. Please include contract number or priority certificate. *Write for bulletin.*

Mohr Lino-Saw Co.
130 N. Union Ave. Chicago, Ill.

Preloaded Precision Bearings for Spindles

MOREY 12M
HIGH-SPEED
VERTICAL
PROFILER
and MILLER



Two spindle or single spindle

Speed and more speed in the production of interchangeable parts requiring milling of any contour or outline is yours in the MOREY 12M. Provision for increased clearance between spindles and table.

Ask for Bulletin 680-A

MOREY MACHINERY CO., INC.
410 Broome Street New York, N. Y.

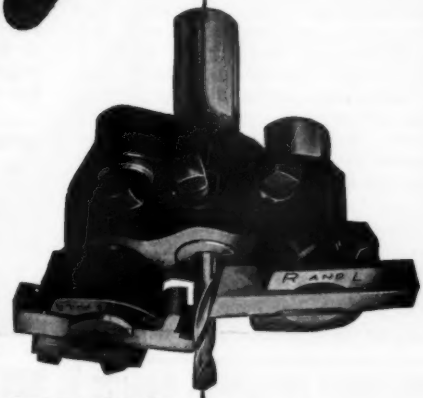
Special jobs on tubing are not always solved thru the use of special machines, however, for there are cases where one of the ordinary machines on the floor may be tooled to do a job that seems difficult of accomplishment. Take as a case in point, the facing and internal or external chamfering of the ends of drawn tube sections. Here is a job that can be performed on an ordinary drill press, if one has the proper cutter for the work. In order to do a smooth job, a pilot disk is used on the end of the cutter, the disk entering the smoother inner part of the tube with sufficient firmness to hold the cutter steady. Back of the pilot disk mentioned, there is a heavy flange of steel mounted on and keyed to the cutter shank. This flange is machined with an even number of evenly-spaced radial slots, and into these slots are set blade-type cutters. With these adaptations, different kinds of cutters may be set in alternating slots. This this is what is done in order to make half of the cutters do the square facing of the end of the tube, and the other half to do the chamfering. Tools of this kind are available from cutter specialists. There are many places where it is highly important to have the ends of tube sections very smoothly machined. One outstanding instance is in the making of light tubular rollers, where the ends must be machined to receive, with a proper fit, the roller ends which carry the guggins.

It is really remarkable how many different forms of hollow steel type may be made by working a length of tubing to the form desired. If you have a good source from which to purchase mechanical tubing, you will be able to obtain it not only in the carbon steels, but also in various alloys of the S. A. E. series, containing chromium, nickel, vanadium or other materials as desired. Forming dies of many kinds have been developed for

Save

with R and L

Turning Tools



A tool that saves time is a great contribution to the safety of this nation. A tool that saves money is a safeguard against non-profit and loss to your shop. R and L is just such a tool.

Speed is the keynote of this vast defense production schedule. This Turning Tool increases production by reducing set-up time, by speeding up cutting, by doing right and left hand turning (it requires only ten seconds to change from a right to a left hand turning tool), and by performing several operations simultaneously.

A savings of over $200 is realized on the initial cost alone. R and L costs less than one-fourth of the tool which it replaces (14 in all). And, because they are simply and ruggedly built, they retain their accuracy, thereby saving maintenance costs. It does away with the reconditioning of extra tools when worn, or replacing when lost.

Write for booklet describing this and Tap and Die Holder, Roller Backrest and Universal Tool Post.

R and L Tools

1827 Bristol St,, Nicetown, Phila., Pa.

such purposes in many toolrooms of different plants. Think this over before developing some expensive machining schedule to obtain a like result.

The bending of tubing, and especially thin-walled material into short radii, is a process that has caused various mechanics a great deal of trouble in days gone by. Some have filled the tubes with sand, plugged the ends and made the bend, pouring out the sand later. Resin has also been used. This is better than trying to bend such a tube without any filler at all, but it leaves a great deal to be desired. The modern method handling such bends is to use a filler of a special low-melting-point alloy which is furnished for the purpose. The material will melt at less than 160° F, so that it can be removed by boiling water.

Have you ever made a particular study of the possibilities of tubing with specific reference to the production problems of your own plant? Both the designer and the production foreman may look into this proposition once in a while. Some modern light-weight machines are using tubing as standards or pedestals, setting the lower ends of husky tubes into proper machine bases, and mounting the other machine elements on the same tubes, above. The material is useful in many types of jigs and fixtures, and cuts down weight to a very great degree as against the use of shafting for like purposes.

EDITORIAL NOTES:

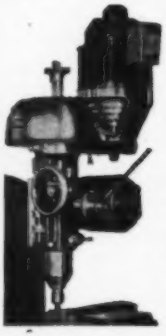
The modern metal-cutting bandsaw, which has used a nesting fixture for cutting off as many as 50 pieces per cut, of small-diameter tubing, is made by Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago.

The special roll-forming machine mentioned, which will roll tubing sections from the strip material cited, was developed some years ago by McKinney Tool & Mfg. Co., Cleveland, Ohio.

MILLING - DRILLING - BORING ATTACHMENT

for

Heavy Duty Operations



Uses many types of cutters on a wide range of work. 1/16" to ¾" end mills.

FEATURES

Large size spindle with No. 9 B&S Taper. Large Quill Diameter with a travel of 4". Furnished with ½ h.p. motor.

The aluminum pulleys provide a range of six speeds, from 250 to 3000 R.P.M. The spindle takes 1/16" to ¾" end mills. Quill is counterbalanced and hardened and ground. Overarm brackets equipped with spreader screw for easy mounting.

PROMPT DELIVERY

Send for Descriptive Folder.

RUSNOK TOOL WORKS

4840 North Avenue, Chicago, Ill.

LITTELL

CONTINUOUS STRAIGHTENING MACHINE

with Automatic Centering Reel

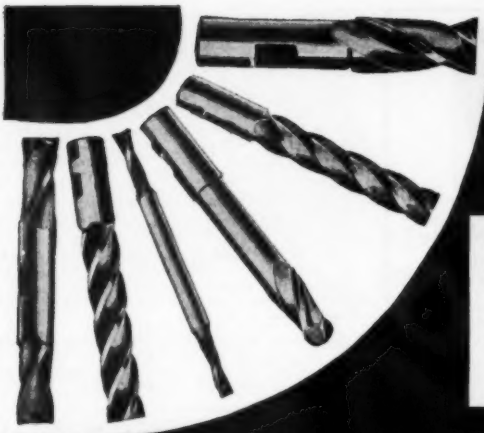
For handling stock of various widths, at speeds of 10 to 60' per min. Portable. Compact. Fits into floor space 17x36". Machine shown equipped with Littell Automatic Centering Reel.

Control arm starts and stops motor and regulates loop of stock between feed and press. Either five or seven straightener rolls may be used. ¾ h. p., 1725 r. p. m., 60 cycle, 220 or 440-volt motor.

Other Littell products include Automatic Centering Reels, various other types of Feeds, Scrap Cutters and Winders, Pres-Vac Safety Feeders, Mechanical Pickers, etc. *REQUEST BULLETINS*

F. J. LITTELL MACHINE CO.

4153 RAVENSWOOD AVE. CHICAGO ILL.



Shear Cut—
High Speed

END MILLS

Shear Cut End Mills are offered in all standard sizes, single and double end.

Write for catalog and prices today.

PROGRESSIVE TOOL & CUTTER CO.
2345 WOLCOTT ST., FERNDALE, MICHIGAN

Special Container for narrow width coils, 100' l. Convenient to use.

ATLANTIC★ Band Saw Blades

Speed Up

Metal Cutting Production

Atlantic Metal Cutting Band Saw Blades have been developed through twenty years of research and specialization.

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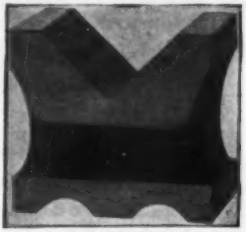
ATLANTIC SAW MFG. CO.

Metal Cutting Band Saws Exclusively

153 Brewery St., New Haven, Conn.

"TRU-V" BLOCKS



Why Not Save Time—by having enough V-Blocks available at all times in your shop to avoid the delays involved in make-shift set-ups and tie-ups?

"TRU-V" Cast-Iron Blocks are available in nine sizes—from 3½ to 10", in three styles. Each block is carefully machined on all sides, with close limits held within .001" where required. A machined ledge on both sides provides for clamping on machine bed.

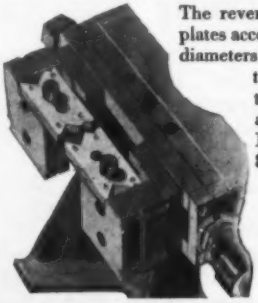
Let us send descriptive bulletin.
Or contact your mill supply dealer.

Oliver Motorcraft Corp.
2532 S. Wabash Ave., Chicago, Ill.

"JOHN'S" DRILL JIGS ★★

SCREW PRODUCTS PLANTS ATTENTION

These Jigs are now supplied with Universal jaws which permit quick set-up for end drilling and tapping.



The reversible "V" plates accommodate diameters from ¼" to ¾" on the 6" jigs; and ¼" to 1" on the 8" jigs.

Write for details.

HEUSER MFG. CO.
1638 N. PAULINA ST., CHICAGO, ILL.

Machine mentioned which straightens copper tubing from the coil, measures and cuts it into equal lengths as required, is made by Artos Engineering Co., 119 Brown St., Milwaukee, Wis.

Tool cited for use in facing ends of and chamfering tube sections, is one of the many tools made by O. K. Tool Co., Shelton, Conn. Severance Tool Co., 722 Iowa Ave., Saginaw, Mich., offers burring, facing and chamfering tools.

Mechanical tubing in the carbon steels and in the others cited, is available from Pittsburgh Steel Co., Pittsburgh, Pa.

The special low-melting-point alloy suitable for filling thin-walled tubing for making small-radius bends without buckling, is sold by Cerro de Pasco Copper Corp., 40 Wall Street, New York City.

Machines for burring, chamfering, threading, reaming or bending tubing on a production basis are offered by Pines Engineering Co., 600 Prairie St., Aurora, Ill.

Kennametal Data Book

Tools with longer tips, new tool styles and applications are announced by the McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa., in their Catalog 43.

This Catalog illustrates standard, non-standard, and special tools. It also contains diagrams which show the correct rake angles for tools made with Kennametal standard blanks. For each style of standard tool illustrated, an operational illustration shows the proper use of the tool. The 40-page Catalog is sectionalized and concerns itself with (1) Standard Tools, (2) Typical Non-Standard Tools, and (3) General Information.

The informative section gives specific information concerning the Origin and Qualities of Kennametal, How to Specify and Order Tools and Blanks, Chip Breakers for Tools, Grinding Tools, How to Avoid Grinding Cracks, Brazing Standard Blanks to Tool Shanks, Milling Steel with Tipped Cutters of Simple Design, Special Applications of Kennametal, and Illustrations of Examples of Machining Operations performed with Kennametal.

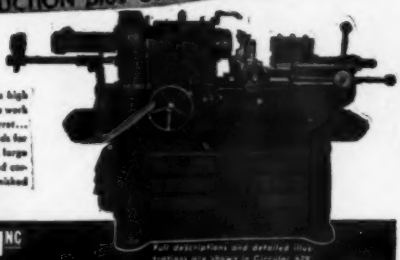
A copy of this Catalog may be obtained on request, if you mention Company employing you.

The MOREY 2G
Back-Geared
TURRET LATHE
Timken Bearing
Self-Locking Turret—Infinite Spindle Speeds

CAPACITY
(Automatic Chuck (round) 1"
Swing over cross slide 6"
Swing over bed 14"

Features HIGH SPEED PRODUCTION plus OPERATING ECONOMY

The MOREY 2G Timken Bearing Turret Lathe insures today's high speed production with a minimum of operating expense. More work at less cost with these money saving features: Self-Locking Turret... Vibrationless precision with an infinite variety of spindle speeds for every job . . . Back Gears instantly thrown in through extra large Twin Disc Clutch . . . takes full advantage of high speed and carbide tools. Modern design for modern production. Can be furnished with tooling.



MOREY MACHINERY CO., INC
410 BROOME STREET • NEW YORK, N. Y.

Full descriptions and detailed illustrations are shown in Circular 629. Ask for it TODAY.

MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S. NAVAL AIRCRAFT FACTORIES

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

BEWARE OF IMITATIONS!
Our machine carries the Butterfly trade mark.

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10" Table; Model E.L. 12" Table.

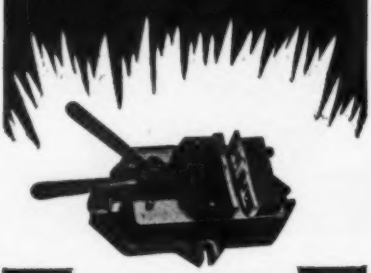
HARVEY MFG. CORP.

161 GRAND ST., NEW YORK

Phone CAnal 6-5170

Registered U. S. Patent Office

HARTFORD
Four point
MILLING VISE
SPEED POWER STRENGTH ACCURACY



A VISE WITH A ONE PIECE SOLID FORGED MOVABLE JAW

This time tested "four point" Milling Vise has performed most successfully in large manufacturing plants producing interchangeable parts. Designed and constructed to take the present day speeds and feeds of modern milling machines . . . It is particularly well adapted to small arms milling.

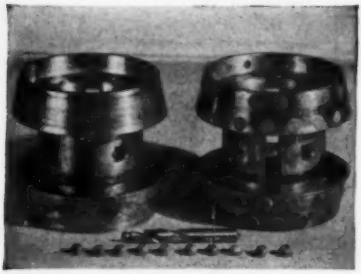
At the present time speed is of the utmost importance; The Hartford Four Point Milling Vise will give you this and more.

WRITE FOR FURTHER DETAILS TODAY.

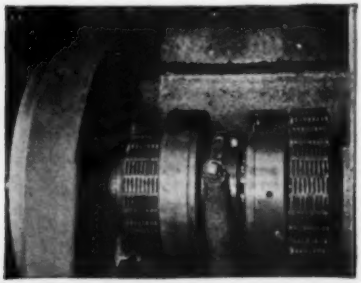
THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD CONNECTICUT

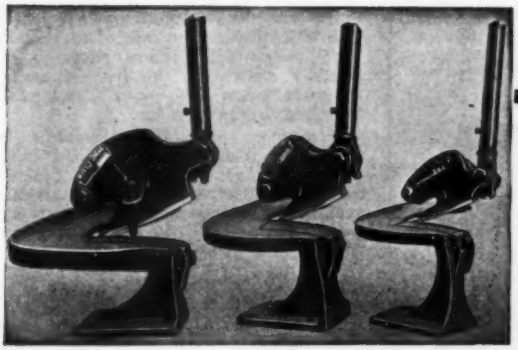
Repairing Automatic Screw Machine Clutches

Compensation for wear in the clutch body and the friction drive rings of automatic screw machines may be made by an outward adjustment up to 5/32" from the friction backs. But as these friction rings are adjusted out, wear also shows up in the threads. The result is a low friction ring that chatters and grabs in changing from different speeds.



Micarta inserts in the friction face of the clutch body allow the friction rings to be adjusted back into the friction backs. In most cases, this does away with the looseness in the threads. This repair makes a smoother and quieter operating clutch than the original brass ring, and it has been noted that less tension is required to drive the spindle. Several such repairs in service for 1 to 2 years show no signs of wear.





Speed-Up WAR ORDERS with

BEVERLY THROATLESS SHEAR

If you're cutting straights—rounds or irregulars on War orders you can speed 'em up and eliminate distortion with a BEVERLY Bench-Type Shear. Order No. 1 for 14 Ga., No. 2 for 10 Ga., No. 3 for 3/16" mild steel and 10 ga., stainless.

BEVERLY SHEAR CO., 3805 W. 110th Pl., Chicago, Ill.

THE *Robertson* COMPOUND ANGLE WHEEL DRESSER

saves precious man-hours in production . . . .

This precision instrument is playing a vital, important part in America's all-out war effort . . . speeding-up production, by saving both time and money.

With the Robertson Compound-angle Wheel Dresser, a machine operator can dress an included angle tangent-to-radius from 0° up to and including 180° at one setting, thus eliminating the old method of "trial and error" dressing.

Write TODAY for illustrated descriptive folder.

F·H·ROBERTSON CO.
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ROGERS REAMERS
SINCE 1885

Conserve High Speed Steel by using Rogers inserted Blade adjustable-for-wear Reamers

JOHN M. ROGERS TOOL CORP.
GLOUCESTER CITY NEW JERSEY

The first illustration shows Micarta inserts in the friction face of the clutch body permitting friction rings to be adjusted back into the friction backs. In most cases this does away with looseness in the threads.

The other illustration shows Micarta inserts in friction face of drive ring, permitting friction ring to be adjusted back into friction back. This repair makes a smoother and quieter operating clutch and less tension is required to drive the spindle.

By J. L. Witchey
Supt. Binocular Dept., Westinghouse Electric & Mfg. Co., Mansfield, Ohio

Cleaning Cavities of Metal

Brushes that look like discs with 2 square corners and rotate like a spinning coin are being produced by Osborn Mfg. Co., Cleveland, for service in industry to remove rust, scale, rubber, burrs, sharp corners, dirt and chips from metal holes, cavities and recesses.

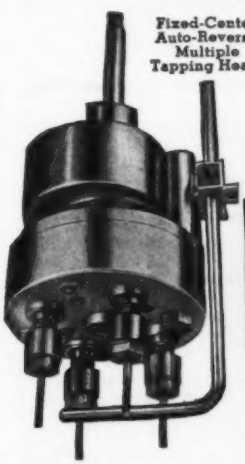
The "Sibot" brushes, as they are called, will clean both the bottoms and side walls in the cavities of various machined, stamped, cast and forged parts in one operation.

"While the most important feature of the Sibot brush is its ability to con-

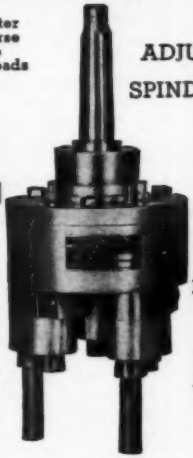
ERRINGTON MECHANICAL LABORATORY

STAPLETON, STATEN ISLAND, N. Y.

MULTIPLE HEADS

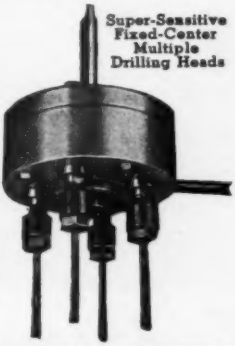


Fixed-Center Auto-Reverse Multiple Tapping Heads



ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles



Super-Sensitive Fixed-Center Multiple Drilling Heads

A CLAMP for Every Purpose

Forged Steel
Quick Acting
Deep Reach
Welders

Sizes Available:
¾" to 10" opening
½" to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co., 1945 WAVERLY AVE., CINCINNATI, OHIO

Tough-Sharp Tools

THAT WILL SPEED UP YOUR FINISHING

In scores of America's busiest war plants Yeomans Rotary tools are throwing off clean sharp chips. They are biting into castings in a hurry. They are doing an A-1 job of speeding production of a tremendous variety of metal parts and castings. Yeomans tools—and Yeomans regrinding service for your Burrs, Die-sinkers, Reamers, Drills, End-mills and Milling Cutters can help you speed your production. Write today for complete facts.

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TOOL CO. • 2703 Bay St. Saginaw, Mich.

tact both side wall and bottom at the same time, its use is particularly applicable to fast methods of production and to relatively easy adaptation to existing production equipment," according to R. O. Peterson, manager of the Technical Department of the company.

He points out that the brushes, which may be used by hand, automatically or semi-automatically, simplify cleaning processes. Their installation and use require only a very small investment as compared to the investment required by equipment needed for sand blasting or ordinary brushes.

Fixtures for operating are usually very simple. The brushes may be inserted into the chucks of ordinary drill presses, for example.

Peterson cites a case record of a company using the brushes to clean fuse parts.

"It was possible for this company to eliminate several tedious, skill-demanding, hand operations with dental burrs, and substitute one fast brushing operation," he said. "This has resulted in the release of floor space and operators for other work. Such a result is of fundamental importance during this national emergency in which high productivity with existing facilities is required. Furthermore the brushes eliminated practically all rejections due to burrs around the holes intersecting the cavities in the fuse parts."

Another advantage of the Sibot brushes stressed by Osborn is the uniformity of results. They are constructed in such a way as to make it impossible to injure the work if proper conditions exist. The reason for this is found in the construction of the brush, which has no metal parts extending beyond its working diameter. The Osborn Sibot brushes are made of wire in 2 ringlock sections with a metal shank between.

Ten Ways to Save

Tons of critical materials, particularly copper, can be saved by following these 10 principles in installing war-plant power distribution systems, ac-

FlexoiD Speed Control units are helping to STEP UP production of MACHINE TOOLS

3 STANDARD 4-SPEED GEAR BOXES
STANDARD 8-SPEED GEAR BOXES
1 TO 25 HORSEPOWER
4 Speed Ratios 3-1
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MANUFACTURERS of machine tools who are already successfully incorporating these sturdy ready-made gear boxes into their products, are enabled to divert critical labor and materials to other channels, thereby increasing their output, so necessary to win the war.

Our engineers are ready and anxious to demonstrate to all makers of SHAPERS, PLANERS, MILLERS, BORING MILLS, etc., the efficiency and surprising economy of FlexoiD Speed Control Units.

Correspondence is invited

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MADE OF ALLOY STEEL
MILLED FROM BAR

SOCKET HEAD
CAP SCREWS

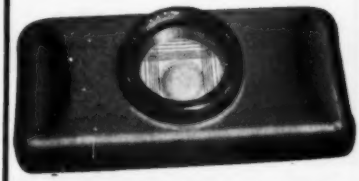
SAFETY HOLLOW
SET SCREWS

Try Them On Your Next Job!

ECONOMY
MACHINE PRODUCTS
COMPANY

5207 Lawrence Ave., Chicago, Ill.

FELL *PRECISION LEVEL*



A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005" per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sizes—5½"x12"; 3½"x6".

Write TODAY for bulletin giving full details.

Wm. B. FELL COMPANY
700 South St. Rockford, Ill.

THE
NEWEST
in
CUTTERS
★ ★ ★ ★
The
"WONDER"

CUTS—Wire and rods up to ⅝ in.
CLIPS—Band iron up to ⅛x2 in.
MEASURES—Length of pieces.

The lowest-priced wire and band cutter on the market. Every Shop, big or small can use a WONDER CUTTER.

Write today for further information and prices.

The Federal Foundry Supply Co.
4602 East 71st St., Cleveland, Ohio

WIPE OFF
RUST and BURNS
WITH
SOL-KLEAN

Simply wet a rag with Sol-Klean and wipe away all Stains, Burns and Rust.

NON — INFLAMMABLE
NON — TOXIC
NON — CORROSIVE

INDUSTRIAL CHEMICAL PRODUCTS CO.
DETROIT
Ft. Wayne Milwaukee

cording to H. V. Erben, Manager of General Electric's Central Station Department:

(1) Calculate as accurately as possible what the **actual** load will be and design the system to carry only that load—not on the basis of connected load.

(2) Keep to a practicable minimum, the distance over which electric power is to be carried.

(3) Transmit power at the highest practicable voltages and bring the high-voltage distribution as close to the load as possible.

(4) Correct for low power factor at a point as close to the reactive load as possible.

(5) Use compact, standard equipment. This not only saves copper, time, and money but also permits quick replacement in case of trouble.

(6) Arrange layouts to limit circuit-breaker interrupting requirements to the optimum values, thus saving copper in buses and breakers.

(7) Use three-phase power transformers wherever feasible.

(8) Use forced cooling on power transformers wherever it is practical.

(9) Select cables with a type of insulation which will permit maximum load per unit of copper.

(10) Limit the number of cables per duct bank to the minimum to avoid loss of current-carrying capacity.

(General Electric Review)

Koebel Pledge Cards

As part of a continuing program of tool conservation, inaugurated before the war, the Koebel Diamond Tool Co., 9352 Grinnell Ave., Detroit, has just published in "American Workman's Wartime Pledge" card, to be issued free of charge to all who request it. The pledge is unique in that it requires no signature, thus becoming a completely voluntary act on the worker's part.

The Koebel Conservation Program, of which this card is a part, originated with the issuance of a poster bearing the legend, "When any man adds a single hour to the production life of a tool, or makes that tool do better work,

Prompt Deliveries of

ACCURATE
Sheet Metal Work

SPARE PARTS BOXES

under Government Specifications

Carefully and rapidly produced in Stackbin's modern plant, Stackbin-made spare parts boxes are meeting Navy requirements and are in use on Navy ships.

Stackbin offers you unusual facilities to fabricate these boxes and other sheet metal products

Behind these special products stand the designing experience and production facilities of a leading maker of parts and materials handling equipment. You can take advantage of their knowledge of sheet metal fabrication. Write Stackbin Corp., 55 Troy St., Providence, R. I., to find out what they can do for you.

STACKBIN SYSTEM

"Stacked and Still Accessible"

STACKBIN CORP., Providence, R. I.

COLBORNE Speed Lathes

SPEED-UP FINAL OPERATIONS ON DIES, GEARS, SCREWS LONG RODS, SHAFTS

For economical polishing, lapping or finishing of gears, shafts, dies, gages, ball races, long rods, etc.

Built to meet the requirements of those desiring a heavily constructed, smooth running machine of highest quality.

Has one H.P. built in motor with variable speed control, using REEVES standard pulley and belt.

Smooth automatic brake acts instantly when switch is thrown.

Collets or chuck may be used.

GOOD DELIVERY

Write today for details

Machinery builders since 1879.

COLBORNE MFG. COMPANY

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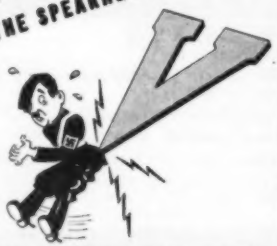
Metal Shapes-

THE SPEARHEAD OF VICTORY



HITLER GETS THE POINT

Innumerable shapes of metal make up America's fighting equipment. RITCO is pledged to produce such parts as fast as its plant capacity permits and 108 years of Yankee ingenuity can devise. Our output soars and augurs ill for the Axis.

SPECIAL BOLTS, NUTS and STUDS
DROP FORGING and DIE SINKING
SCREW MACHINE PRODUCTS
HEAT TREATING
SPRAYED METAL SERVICE

Estimates gladly submitted.
Send samples or blueprints.
Catalog on request.

RHODE ISLAND TOOL COMPANY

148 West River St.
Providence, R.I.

Serving American Industry Since 1834

RITCO

that man makes a worthwhile contribution to American ideals and to America's future." This poster, which is to be seen in shops and factories all over the country, is reproduced on the reverse side of the new pledge card.

Every workman who receives the card pledges that:—"As a soldier in our mighty production army, upon whose skill and unstinting labor the lives of millions and the freedom of all depend,

"I Pledge That—

"I will take care of my tools and machines.

"I will help and instruct my fellow workmen whenever I am able.

"I will waste neither time nor materials, to the end that all of America's productive resources may be dedicated to final and complete victory.

"I Will Do My Best!"

Cards are available to industry, in any quantity desired, on request.

Black Hardsteel Drills

You may never have occasion to drill thru a file; but, if you do have occasion to drill thru "something just as hard" . . . Black Bros. Drill Co., 5005 Euclid Ave., Cleveland, have a drill for it, according to their newly-released booklet, "Hardsteel Drills". In the booklet, you'll find a picture of drilling thru a file. Illustrated, also, is a Hardsteel drill biting a hole thru a 17% Manganese tractor shoe. Described, too, is an instance where, on a crimping die for making aluminum mess trays for the Navy, drilling for gage-pins was done with a Hardsteel drill, after hardening . . . die maker having forgotten to do it before. The booklet, which is available from the firm, details uses for products it makes from the metal. Among these; for drilling armor-plate, any depth or hardness; reaming cored holes in castings; drilling hardened production parts; or drilling them after hardening, at assembly, to insure perfect alignment; drilling thin gages, after hardening, to eliminate cracks or distortion after hardening . . . etc.

The booklet details the types and sizes of drills available as well as techniques recommended to get best results.

a Natural...

IN ANY SHOP

This modern machine vise is a "natural" because it just naturally is an asset to any machine shop. For machining slots and keyways in shafts or spindles, ⅜" to 3⅛" diameter — suitable for horizontal or vertical mounting. Setting of vise remains unaltered for all work diameters — insures accurate radial cuts. Hardened V jaw reversible in vise — equal movement of two jaws locates shafts correctly in V jaw.

Base size 8" x 7¼". Approx. wt. 80 lbs.

Write for circular.

The **PRODUCTO MACHINE COMPANY**

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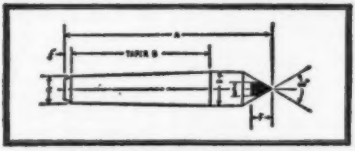
3017 MEDBURY DETROIT, MICHIGAN

SAVE TIME — SAVE GRINDING WITH

Tamaloy Carbide Tipped Lathe and Grinding Centers

CENTERS ARE TIPPED WITH A SPECIAL GRADE OF TAMALOY, A HARD WEARING, NON-GALLING CARBIDE ELIMINATING THE NECESSITY OF FREQUENT GRINDING AND LASTING FROM 50 TO 100 TIMES AS LONG AS HIGH SPEED STEEL.



STANDARD CENTERS

Morse Taper	Taper, per ft.	A	B	C	D	E	F	Price
1	.59858	3 1/8	2 1/8	.369	.475	1/4	3/8	$3.00
2	.59941	4 1/16	2 9/16	.572	.700	5/16	7/16	5.00
3	.60235	5 1/16	3 3/16	.778	.938	7/16	5/8	8.00
4	.62326	6 7/16	4 1/16	1.020	1.231	1/2	3/4	12.00
5	.63151	8 5/16	5 3/16	1.475	1.748	5/8	7/8	18.00
Brown & Sharpe Taper		**Taper approx. ½" per ft. except No. 10 which is .5161" per ft.**						
7		4 1/2	2 7/8	.600	.720	5/16	7/16	5.00
8		5 9/16	3 9/16	.750	.898	3/8	9/16	6.75
9		6 1/4	4 1/4	.900	1.077	7/16	5/8	8.50
10		7 1/2	5	1.044	1.260	1/2	3/4	12.00
11		9 5/8	5 15/16	1.250	1.498	5/8	7/8	15.00

PRICES ON SPECIAL CENTERS ON REQUEST

CIRCLE TIP TOOL CO., INC., - 65-67 Colden St., Newark, N. J.

Tapping machine operators in key war industries everywhere are "discovering" in THREADWELL Taps the way to new records in threading performance. To them, this new name THREADWELL means *results* -- more holes per tap, and superlative quality. Have you tried THREADWELL?

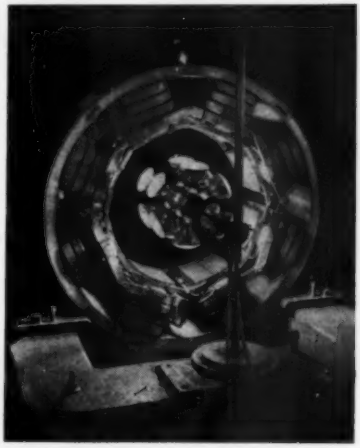
WRITE FOR CATALOG ON YOUR FIRM LETTERHEAD.

THREADWELL TAP AND DIE CO.

GREENFIELD, MASS.

SALES AGENTS:
Canada - BRIDGE MACHINERY COMPANY, Montreal
England - SKYLUX, LTD., London

Infra-Red Insulation Drying



Time outages are reduced by using infra-red to recondition coils in motors and armatures. This portable drying unit composed of twelve 250-watt R-40 bulb Westinghouse drying lamps enables the John D. Crawbuck Co. plant, Monoca, Pa., to reduce drying time of this 300-horsepower mill motor from 3 days down to 8 hours.

Motor and generator reconditioning jobs that formerly required 3 days, due to oven drying, are now completed in 8 hours by infra-red heating at the John D. Crawbuck Co. Plant, Monaca, Pa., according to Walter S. Crawbuck, Electrical Engineer. Other advantages are a financial saving of 50%, simplification of work and performance of the repair jobs without necessity of completely dismantling the equipment involved.

Infra-red is used at the Crawbuck plant to heat armatures, motors, etc., and to bake varnish. Two 10-unit lamp banks on adjustable stands are used for drying motor and generator rotors, and a 12-unit bank is set inside the reconditioned stators. Lamps used are the Westinghouse 250 watt R-40 bulb type with built-in reflectors.

By the old method it was necessary to dismantle large motors and generators for reconditioning at the Craw-

EXCELSIOR No. 14 ANGLE ROLLING MACHINE

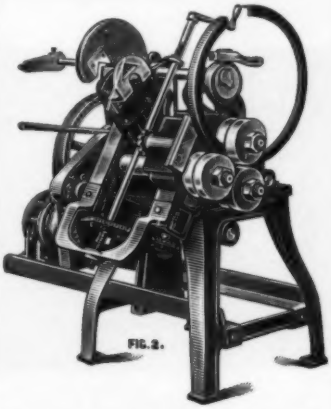


FIG. 2.

Capacity 2x2x¼" Angles. All the rolls are direct driven avoiding slipping of the material between rolls, which are operated by the oversize Excelsior friction clutch. Write for Price and Testimonials.

We specialize in Automatic Grinding and Polishing Machines, to polish Stainless Steel Sheets, Automobile Bumpers, and parts, Stove and Range Top Castings, Electric Iron Sole Plates, etc.

Also Inside Cutting Shears, Deep Throat Power Punches for duplicate work by the use of horse shoe templets up to No. 12 gauge. Used in Stove, Range, Air Conditioning and Kitchen Equipment Plants.

EXCELSIOR TOOL & MACHINE CO.

East St. Louis, Illinois

YOST DRILL PRESS VISE

This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY
1335 SO. MAIN ST.
MEADVILLE, PENNSYLVANIA

NIELSEN Heavy Duty *Live Centers*

Write for catalog on live centers

Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

NIELSEN, INC. LAWTON, MICH.

CATSKILL

★ ★ ★

Abrasive wheel cutting is the modern way to speed up operation and lower cutting cost. This machine cuts tubing to 3", solids to 2" accurately, smoothly. Especially recommended for cutting high alloyed hard steels and many other materials. Designed and engineered for high production, ease of operation, safety, and long life. Prompt delivery.

WRITE FOR BULLETIN GIVING DETAILS

CATSKILL METAL WORKS
CATSKILL, N. Y.

buck plant, since the drying ovens were not portable. With infra-red, the portable radiant heat unit may be taken to the object—a particularly desirable practice in the case of 300 or 400-hp motors and repairs are made on the job, resulting in large savings in time and man-hours.

Cost and approximately 100% time reductions result from drying a stator frame and windings from a 300-kw synchronous rotary converter by these 10-lamp units of Westinghouse 250-watt drying lamps at the John D. Crawbuck plant, Monoca, Pa. (Photos—Courtesy Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

In drying the windings, the temperature is raised very carefully to preserve the life of insulation. The infra-red radiation sets up the required temperature in the windings, thus avoiding extraction of parts. Temperature is regulated and a further improvement is the installation of a thermostatic control to disconnect the lamps when the coils have been properly dried.

Beg Your Pardon

In the cut line describing the different types of Osborn brushes used in aircraft engine work, (page 366 November Blue Book) the surface speed of the Disc Center Wire Section was given as over 10,000 feet per second. Obviously, this should have been 10,000 feet per minute. Our apologies to the readers and to the Osborn Mfg. Co.

P SPECIAL PURPOSE

NUT SLOTTER

THE MACHINE ACCEPTED BY THE AIRCRAFT INDUSTRY

Slots Two Sizes at once

Slots all aircraft sizes and all materials

- 6 CUTTERS MILLING CONSTANTLY . . . . .
- 2 CONVEYORS RUNNING CONTINUOUSLY . . . . .
- AUTOMATIC INDEXING . . . . .
- AUTOMATIC BURR REMOVAL . . . . .
- AS HIGH AS 3000 SLOTTED NUTS PER HOUR . . . ALL SIZES FROM 3/8 to 15/16 HEXAGON ACROSS FLATS

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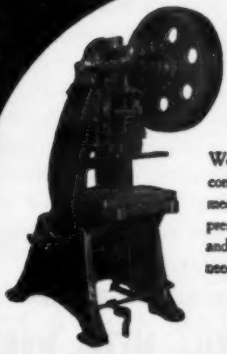
Fastest and best known means of cutting sheet steel, aluminum and magnesium sprues, gates, risers, and kindred items. Provides saw blade travel of over 2 miles per minute with perfect safety. Cuts are exceptionally smooth. Labor savings ranging from 25% to 90% are the usual thing.

For complete details simply write for bulletin on metal cutting band saws.

Built by Sawing Machinery Specialists

THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN

RECLINABLE POWER PRESSES



We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

Write for bulletins.

ZEH & HAHNEMANN CO.
Newark, New Jersey

Eliminate . . .
HAND REAMING WITH
THIS POWER REAMER
★ ★ ★

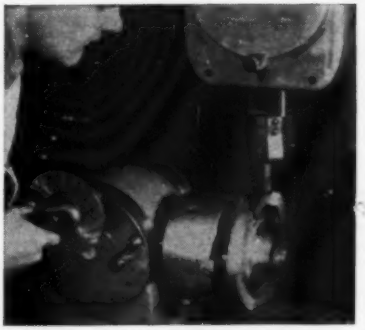
Power Reaming at its best. Saves time and money. Improves your work. Speeds up removal of burrs from tubing as well as from bores after keyseating or drilling of set screw holes. The Catskill also saves on finish reaming, countersinking and counterboring, smoothing off and chamfering sharp edges of round bar stock and many other finishing jobs.

WRITE FOR DETAILS

CATSKILL METAL WORKS

CATSKILL, NEW YORK

Cuts Cam with One Set-up



The shaping of feed cams is a problem that may be solved to advantage with use of a Slotmaster. The cam blank is chucked in the Dividing Head on a round or flat-on round over-arm milling machine upon which a Slotmaster is mounted. The rise in the cam is then readily calculated between the Dividing Head Index and the Micrometer Dial on the Milling Machine Feed Screw. In this way, a true and uniform cam rise is obtained. Only one set-up is required and the time for calculation is negligible. Any other method, such as might be accomplished on a shaper or milling machine of conventional design would require numerous time-consuming set-ups.

(Photo, Courtesy Experimental Tool & Die Co., 12607 Greiner, Detroit, Mich.)

Workers Honored

As a result of their production ideas, 8 employes of Westinghouse Lamp Division at Bloomfield, N. J., have recently been awarded the War Production Board's industrial certificate for individual contribution to the war effort.

Scott, who is a machinist in the bulb-blowing department, was awarded a $50 bond for his suggestion that scrap hack-saw blades be used in the making of bulb-blowing cutting knives. Because of a shortage of good quality steel, the old knives were of inferior

BALANCING PROCEDURE:

1—Mount wheel unit in grinding machine.
2—Then true wheel.
3—Remove wheel unit.
4—And balance it—You are then ready for precision grinding.

(Taken from No. 17 in a series of Shop Bulletins entitled—On The Grinding Line—published by Norton Co., Worcester, Mass.)

AFTER TRUING A NEW WHEEL ON THE MACHINE, YOU SHOULD THEN TAKE IT OUT AND BALANCE IT.
OH! MAYBE THAT'S WHY I'M GETTING CHATTER MARKS - I BALANCED IT BEFORE TRUING
HE WOULDN'T BELIEVE ME WHEN I TOLD HIM HE SHOULDN'T BALANCE IT FIRST!

grade and required sharpening and resetting several times a day. The hacksaw blades, made of molybdenum steel and no longer fit for their original use, were found to be excellent as cutting knives, lasting 5 or 6 times as long, costing less money and improving quality and production.

Compressed Air Simplifies Chucking

The device shown holding the grooved cylinder is said to be a great aid to the modern machine shop in war production. It is an expanding arbor on a chuck in a metal working lathe. The worker slips the part to be machined over the arbor and presses a button. Compressed air from the factory's air line expands the arbor and holds it securely. When the job is finished, the worker presses the button again and the part is released. In one motion, it eliminates much hand work of fastening, adjusting, and unfastening. These expanding arbors can be found in many war production plants, cutting hours and days off war production time and reducing worker fatigue.

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The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading. Priority rating required.

Price $5.00 plus postage *Write for folder.*

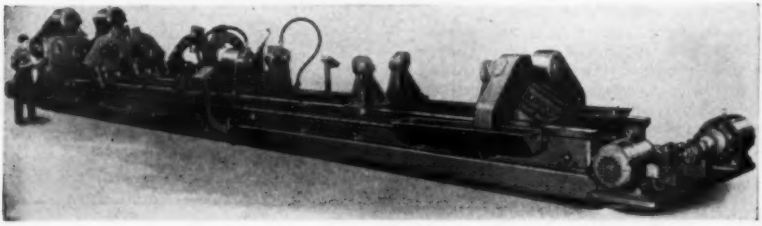
J. R. Reich Manufacturing Co.
45 E. Stroop Rd., Dayton, Ohio

"Tooling Up" for

445 Independent 2-Spindle Deep Hole Drilling Boring Machine

THE new W. F. and John Barnes 445 is designed to drill or bore 2 parts simultaneously in completely independent cycles. Each workpiece is driven by independent headstocks, and is supported by separate steadyrests. Tools are fed by independent hydraulically actuated slides.

Machine base, with 3 ways running full length, is cast in 2 sections. Head section has tee slots milled into center way for clamping headstocks and steadyrests to ways. Other sliding members are clamped to outsideways by gibs bolted to underside of each member. Loosening tee slot bolts and clamp gibs, each headstock can be positioned at any place along head base.



Four-jaw independent type chucks 15" in diameter are normally furnished, but chucks up to 24" diameter may be used.

Steadyrests are of the 3-point roller type having adjustment on each of the rollers. Each of the 3 rollers is carried by a double row of tapered roller bearings. Screw adjustment for each of the rollers permits handling of work from 5" minimum to 16" max. od. Top portion of each steadyrest is hinged to facilitate convenient handling of workpiece when loading and unloading. A vee locator moved by a hand crank is incorporated into the steadyrests and provides support for workpiece when loading and unloading, preventing possible injury to rollers or steadyrests by careless handling.

Two quill type tailstocks manually advanced by rack and pinion are operated by levers at top of quill support brackets. Quills are clamped in position by moving levers toward a vertical position, which by cam action locks the rack. Tailstocks are clamped to ways in the same manner as headstocks and steadyrests.

Mounted on accurately scraped ways are the whip supports and tool holders. Whip supports are positioned midway between tool holder and tailstock at beginning of work cycle. Springing of tool shanks at start of work cycle is prevented by guide bushings in whip supports.

SHELDON Back Geared Screw Cutting PRECISION LATHES

FOR THE TOOL ROOM

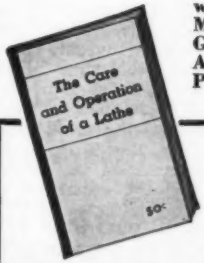
The finest 10", 11" and 12" lathes ever built in the moderate price field. Large special analysis steel spindles ground all over, with extra collet capacity. Hand scraped Bronze Ultra-Precision Ball or Super-Precision Roller Spindle bearings (the finest bearings obtainable). Heavy braced, semi-steel beds with hand scraped ways (2 V-ways and 2 flat ways). These lathes come with a choice of aprons, gear boxes, and drives including the anti-friction base motor drive illustrated. Telescopic Taper Attachment and other accessories available.

FOR PRODUCTION

Sheldon Lathes will stand up to any production work within their capacity—are ideal for second operation work. Production models available with any or all of these features: Ultra-Precision Ball or Super-Precision Roller spindle bearings. Lever-operated Collet Attachment, Lever-operated Tailstock, Lever-operated cross slide with double tool post, Lever-operated turret, etc.

FOR MACHINE SHOP

Both Bench and Floor models with choice of Semi-quick or Full-Quick Change Gears, Plain Aprons or Worm Feed Apron with Power Cross Feed, Overhead, Back or Underneath Motor Drives—Telescopic Taper Attachments, Tool Post Grinders, Milling Attachments and all standard accessories. Also a full line of Arbor Presses and milling machine Drill Press and Shaper Vises.



WRITE FOR CATALOG

Just out "The Care and Operation of a Lathe" to help apprentice training. 50c list price, discounts for quantity purchases.

SHELDON MACHINE CO. INC.
4242 N. KNOX AVE., CHICAGO, U.S.A.

Whip supports remain stationary until tool slides have been fed forward to meet whip supports. Whip supports are then carried along ways until feed cycle is completed. When tool holders are traversed to starting position, whip supports are carried to their original position by a latch on each tool holder controlled by dogs clamped to center way.

Two motor-driven hydraulic feed and traverse units at the head end of machine, actuate hydraulic feed cylinders mounted in base.

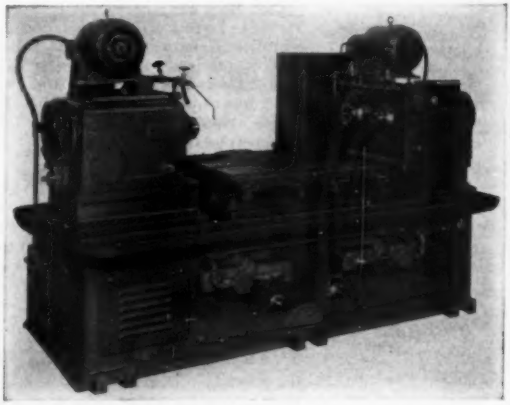
Machine may be completely controlled from each of 4 stations, 2 on either side of machine, at side of head and at center of machine.

Each spindle has its own motor-driven high pressure coolant pumps. Coolant stored in base is pumped thru telescoping pipes, at side of machine, and to the tools thru short lengths of flexible hose.

Movable chip baskets and chip chutes may be positioned at head, tailstock, or tool holder depending upon the operation—drilling, boring, or reaming.

Stroke is 16'; swing, 25" diameter; length of part; 15'8" max; steadyrests are 5 to 16" dia; tool size is 5" dia; spindle centers, 26" dia; spindle height from ways, 20" dia; spindle hole, 4¼"; weight is approx. 83,000 lbs.

Heavy Duty, Double End Facing and Centering Machine



A heavy duty, double end facing and centering machine has been developed by Snyder Tool & Engineering Co., Detroit in standard sizes that will take work lengths ranging from 12 to 20"; 20 to 28"; 28 to 36" and 36 to 44".

It consists of 2 units, each equipped for milling and centering. The milling spindle is provided with a No. 50 National Machine Tool Builder's standard taper. It is worm wheel driven and is mounted on Timken roller bearings. The centering spindle is ball bearing mounted and is of quill type construction, the quill having hydraulic feed. All moving parts are lubricated by an oil jump from an inbuilt reservoir.

The cutter range for milling is 3 to 8" and center drills may range from 5/16 to ¾". The machine is hydraulically operated and electrically controlled.

In the work cycle the part is located and clamped into fixture, and upon cycle start button being pressed, fixture and slide move in rapid traverse away from operator and feed the work between the 2 milling cutters. When work piece is faced to length, the slide returns to the original loading position—opposite the centering drills. Centering tools are then fed into work and the return of these tools to starting position completes the cycle.

Fixture shown in the inset is for a shaft with a diameter of 4¼" at one end and a flange of 6" diameter on opposite end.

This was clamped manually by 3 automatically centering jaws. Similar fixtures have been designed with hy-

Information supplied by "The American Weekly"—Mr. R. D. Potter, Science Editor

More and more wartime conditions are bringing men over 40 into high-speed or close tolerance industrial work. Many of these have eyes not quite up to the job. Under peacetime conditions this defect is not of vital importance, but today with every nerve strained to increase production, it is serious.

Some industries are giving mass eyesight examinations seeking to find those employees needing glasses or optical corrections in the glasses they now have. Still others take the added precaution of endeavoring to fit the job to the type of eyesight available for it—near-sighted people may be excellent on close work such as bomb sight assemblies, whereas far-sighted people would be better suited to work on a large lathe where micrometer readings must be made at distances as great as 30 inches. Following this thought further some companies have employed special occupational eye glasses ground to fit the working conditions of the employee.

Efficient eyesight is the backbone of fast, accurate production. It will pay industry to further it by every means possible.

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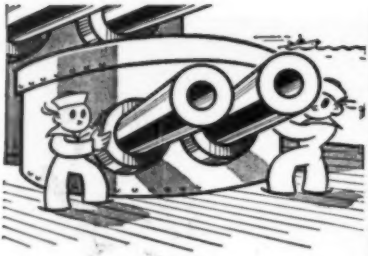
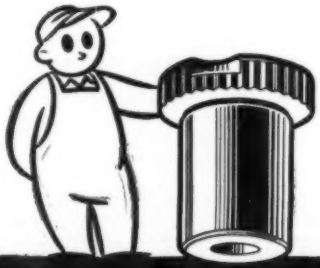


THEY'RE NOT BIG GUNS—
BUT THEY'RE MIGHTY
IMPORTANT TO UNCLE
SAM'S ARMS PROGRAM

In plants from Maine to California Universal Drill Bushings are busy doing their bit toward stepping up the speed and efficiency of America's Arms production. Because of their straight and round superfinished bores, Universal Bushings save tools and assure accuracy. Write for further facts.



UNIVERSAL
Engineering Company
Frankenmuth, Mich.

draulic clamping. The milling cutters were 6½" in diameter at both ends and center drills in this case were longer than standard and held in drill chucks and adjustable adapters and were guided by a drill bushing. These can be held also in standard center drill chucks, omitting guide bushing and bracket.

Welded steel base of machine encloses the hydraulic equipment, piping, etc., and adjustable trip-dogs which are set up at the beginning of the job for the respective work lengths. The coolant is contained in an auxiliary tank in rear of machine. Cover of this tank is a removable chip tray.

Bliss Inclinable Presses

With bodies and legs redesigned, addition of improved type of connection straps and numerous other improvements, a new line of Bliss, Toledo and Consolidated inclinable presses is announced in Catalog No. 2, by E. W. Bliss Co., 53d St. at 2nd Ave., Brooklyn, N. Y. Stressed among other features of these machines is the rolling key clutch, said over a period of many years to have made possible high speed and production rates in these machines.

Practically all sizes up to 75-tons capacity are furnished in 2 throat depths. New sizes have been added in the Consolidated Nos. 9 and 10, extending the line from 10 to 200 tons capacity.

Full details and specifications are given on the full line, with every model illustrated, together with major attachments.

No attempt has been made, states the book, to show the various feeds and devices which may be fitted into these presses to increase production and maintain safety of operation. Attachments are illustrated and discussed in a separate catalog covering automatic feeds.

The catalogs may be had by addressing the firm's New York office.

**If You Can't Carry a Gun—
You Can Buy One for Uncle
Sam with Your
Purchases of War Savings
Bonds and Stamps!**

Model M-2 Zephyr Centerless Grinder

A new model M-2 Zephyr Centerless Grinder is offered by the H. Leach Machinery Co., 387 Charles St., Providence, R. I. Its standards of precision are given as:—Accuracy to size within .0001"; accuracy of concentricity within .0001" and accuracy of parallelism within .0001" (to .0005" depending upon length).

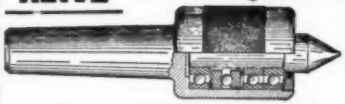
Some of the specifications are:—Standard thrufeed work rest—1/16 to 4¾" dia; standard infeed work rest—¼" to 4¾" dia; grinding wheel, 20" diameter, 4-8" face, 12" hole; regulating wheel is 12" diameter, 4-8" face, 6" hole; grinding wheel speed is 6000 fpm; regulating wheel feed speeds offer an infinite range from 15 to 45 rpm; regulating wheel truing speeds cover an infinite range from 300 to 900 rpm; regulating wheel angular adjustment is 10°; sizing adjustment, fine hand crank is .0001"; sizing adjustment, quick pilot wheel is .001"; work blade adjustment, fine hand crank is .0001"; wheel truing equipment is hydraulic; coolant pump capacity is 50 gpm; coolant tank capacity is 150 gallons; floor space required is 5'6" w x 8'0" l; overall height is 5'0"; net weight is 10,000 lbs.

The base is of sturdy welded steel construction, adequately braced for rigidity. Bed casting is of seasoned close grain grey alloy iron, adequately ribbed.

The housings for grinding wheel spindle are integral with the sturdy bed casting. Grinding wheel spindle rotates between the two housings, each of which contains a bearing cartridge with 2 precision Timken bearings. Drive is by multiple V-belts. Wheels can be changed without disturbing bearings.

The regulating wheel speeds are controlled by a variable speed gear reduction drive, driven by a 1½ hp constant speed motor. Entire drive is mounted on an adjustable cast iron table, carrying the two housings for regulating wheel spindle which is identical with grinding wheel spindle mount. Adjustable table eliminates idlers for maintaining tension of chain used to drive regulating wheel spindle. Table is mounted on cast iron sliding

"ALIVE" Ball Bearing Centers



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Luma Electric Equipment Co.

Dept. H—Main P. O. Box 132, Toledo, Ohio

bed so it may be pivoted for angular settings. On top of this pivoted table is mounted the regulating wheel truing attachment.

Bolt holes are arranged for securing work rest of either thrufeed or infeed type to auxiliary sliding bed locked to main sliding bed so work rest blade maintains its relation to regulating wheel at all times.

A straight hydraulic power feed truing device is used on both wheels. A convenient lever controls direction of the truing device and speed is controlled by a throttle valve.

Hydraulic system mounted in base, comprises a motor driven pump, reservoir, pressure valves and other necessary parts.

Coolant flows from machine bed into a series of settling basins before reaching storage tank, on which is mounted an individually motor driven pump of capacity sufficient for heavy stock removal jobs. Coolant tanks may be cleaned while machine is in operation.

A 15 hp ball bearing 1750 rpm motor drives grinding wheel spindle. (A 25 hp motor is optional. Regulating wheel spindle is driven by a 1½ hp 1750 rpm ball bearing motor. Hydraulic and coolant pumps are driven by ½ hp 1750 ball bearing motors. Starter buttons are conveniently located in base. Master stop button is near work rest.

Electrical equipment can be supplied for operation on 220, 440 or 550 volts, 25, 50 or 60 cycles, 2 or 3 phase a-c of standard make, NEMA frames, normal torque and low starting current; or 115 or 230 volts d-c of standard make, shunt wound and constant speed.

Screw Machine Cams

IMMEDIATE DELIVERY

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1. **THE WILDER PROJECTOR.**
The Wilder Projector enables you to see exactly where tools, templets, gages, threads, etc. vary from specified dimensions and contours, and how much they are out. Magnifications available from 10x to 100x. BASE PRICE....**$267.50 F.O.B. WALTHAM**
2. **A SET OF GAGE BLOCKS.**
accurate within .000008" is a necessity to provide the basic standard of measurements, from which all production starts and all measuring tools and gages, used throughout the shop are checked and set. There are large and small sets of our Ultra-Chex lines to suit all requirements. 34-block set, **$125.00 F.O.B. New York**
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Gives accurate dependable readings in 1/10000". Gage blocks, plug gages, tools are checked for size, tolerance and wear. Mass produced parts such as bearings, pins, bushings, are rapidly checked without dependence upon the skill or "feel" of the operator. Stand. size 0—6" size .....**$195.00 F.O.B. New York**
Heavy-duty 0—8" size.....**$250.00 F.O.B. New York**
4. **OPTICAL PARALLELS.**
Required to inspect the surface of gage blocks, lapped surfaces of all kinds and parallelism of micrometer anvils. Single parallels. **$10.00.**
2 Parallels, ½ turn of micrometer screw.....**$25.00**
WRITE FOR FOLDER SHOWING SIZES AVAILABLE.
5. **REED PRECISION MICROMETERS.**
1" and 2" in 1/1000" and 1/10000".
6. **SPENCER BINOCULAR MICROSCOPE.**
With three demensional vision reveals scratches, surface finish, imperfections, which cannot be seen with ordinary microscopes showing one plane of vision.
PRICE **$153.50**
All prices subject to change.

Safeguard your production from the scrap pile

Quick production is not your only problem. Machine tools may be speeded up, hours saved by better set-ups, over-time and extra shifts may be installed. Yet this will be of no avail or benefit if the accuracy of your product is lost with your material ending on the scrap heap. The best investment for any shop is in inspection tools to detect and eliminate the errors at the source before they can affect production.

Give your men the right tools to measure with. Remember that whether you manufacture to close tolerances of "tenths" or to wide tolerances of plus or minus .002", you must still start with the basic accuracy in tenths of thousandths or else your work will not interchange with that produced in other shops.

Invest in the Scherr Limited Budget Inspection Laboratory to guard against future rejections, disputes and loss of time, labor and material.

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FREE
Manual

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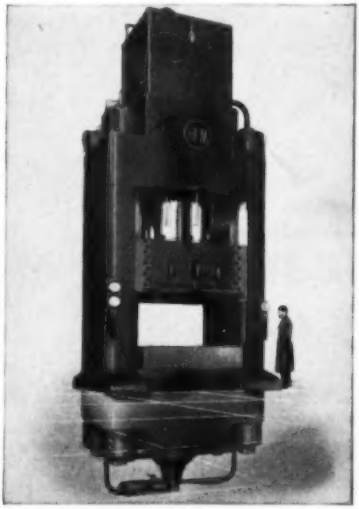
Pressure Capacity— 7,000,000 Lbs.

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, announces completion of one of the world's largest self-contained deep metal drawing presses. It embodies 2 hydraulic actions:—(1) A 3500-ton downward acting die platen; (2) A 1000-ton hydraulic die cushion in press bed.



The press is capable of deep drawing heavy steel plate to a depth of 18". More than one drawing operation may be required, depending upon thickness of metal and reduction required.

Unlike mechanical deep drawing presses of long fixed stroke, the die cushion press may be effectively operated on varied lengths of stroke and at full pressure capacity for any distance. Also, with die cushion idle, press can be used for single action pressing such as coining, sizing, straightening, etc.

Only one hydraulic pump is required. Oil trapped in die cushion cylinder is intensified by downward acting move-

SPEED UP PRODUCTION—
SAVE ON IMPORTANT WORKING TIME

WITH THE NEW WINDERMERE MAGNETIC ADAPTER

The Windermere Magnetic Adapter features a *Magnetic* top surface as well as bottom. By removing the upright center post and collar, the ADAPTER is transformed from an Indicator Holder to a general work-holding block. The strength of the Magnet is ample to afford the user a wide scope of applications. The accompanying photographs illustrate a few of the many possible uses.

The Windermere Magnetic Adapter will last indefinitely without loss of strength and is COMPLETELY GUARANTEED.

Many of these new MAGNETIC ADAPTERS are used in plants to supplant clamps and special holders, thus saving valuable man hours, and speeding up production.

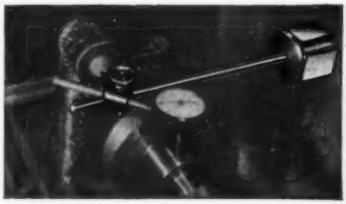
Delivery from stock with Priority.

On the Layout Table — The upright center post and collar have been removed and the base is now operating as a work-holding adapter, thus eliminating clamps.

Adapter—Inspection layout, shows adapter with center post and collar removed, thus anchoring surface gage and indicator securely; enabling quick inspection of work without disturbing setting.

★

Windermere Magnetic Adapter is available in one size only with upright post in two standard sizes — 5/16"; 3/8". Please stipulate size when ordering. $16.75 in U. S. A. F.O.B. Clamp with rod: $2.00.



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Designed for horizontal operation in automatic screw machines and turret lathes. Universal Floating Chucks are ideal for drilling, counterboring and reaming. Adjustable spring pressure compensates for tool weight thus preventing scored holes. Write for complete facts and prices.

UNIVERSAL
Engineering Company
Frankenmuth, Mich.

ment of main press slide. This intensified pressure produces the resistance force necessary for holding blank. No compressed air or other outside pressure source is required to operate die cushion.

An H-P-M compound press ram permits use of 2 main slide pressure ranges:—(1) Medium pressure range to 1000-tons; (2) High pressure range from 1000 to 3500-tons. These 2 pressure ranges can be applied in sequence thru press cycle, or independently as desired. The compound ram system is especially beneficial when a great portion of pressing stroke can be accomplished with medium pressure and only high pressure is required for final forming or "bottoming up". If work permits, it is also possible to perform complete pressing stroke with only medium pressure, and consequently with a faster pressing speed than would be the case if both medium and high pressure ranges were used.

The closed circuit operating system provides for accurate control of all press ram movements without an operating valve. Instead, press ram is reversed by reversing delivery of the Hydro-Power radial pump. Means are provided for operating press in any one of 3 different ways, viz., manual, semi-automatic or full automatic. Electric pushbutton controls are provided.

Solenoid Engineering Data

Two new Davis-Made Laminated solenoids are described in a bulletin released by Dean W. Davis & Co., 549 W. Fulton St., Chicago, Ill., viz., No. 2861 pull type and No. 2923 push-pull type.

They are particularly designed for specification by engineer-designers for hydraulic valves and general industrial purposes. Maximum magnetic force for given electrical input is effected by design, laminated frame, plunger and other features. More work per watt input is claimed.

Coils may be paper section wound, cloth-taped and treated to make impervious to cutting oils and coolant. Installation is easy for either direct or remote control, and quick short thrusts; a-c or d-c; all voltages; stroke 7/8".

Bending

There are many aspects of bending, for some of which special or standard bending machines are used. Some of which have been accomplished by out of the ordinary methods. An instance of the latter is the use of a resistance welding machine (or induction heater) for heating pipe, preliminary to making bends. This has been done to advantage in some shops, for the resistance welder is very fast on the heating end of things, heating pipe from 1 to 3" in diameter, in a matter of a few seconds.

Did you know that repeated cold bending of steel is a method used by some of our foremost steel companies for testing fatigue resistance of various alloyed steels? These firms have special equipment to do the bending. When you bend a piece of steel again and again, you gradually and inevitably come to the place where the material reaches a state of utter fatigue and will break. Such a test cannot fail to tell the story, and furnish a means by which steels can be kept to given laboratory standards.

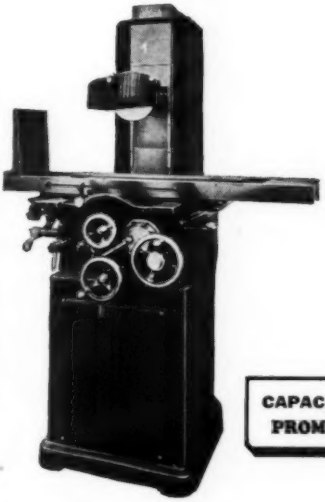
A great deal of bending, so far as it relates to tubes and pipe, falls within a scope comprehended in small diameters, but whether pipe be large or small, machines for bending it are readily available in both hand and motor operated types. One firm, making bending machines suited for bending steel pipe anywhere from 8" od on down to the smallest sizes, uses segments arranged for making bends up to 180°. It is fitted with a finely graduated gage for accuracy, and permits of making either right or lefthand bends.

These machines may be provided for making compound curves.

ATLANTIC

No. 2 Automatic Precision

SURFACE GRINDER



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POPE—S.K.F.
SELF-CONTAINED
SPINDLE

CAPACITY 6' x 12' x 18'
PROMPT DELIVERIES

ATLANTIC MACHINERY CORP.
149 BROADWAY, NEW YORK, N. Y.

VOLUME and SPEED
Combined with ACCURACY!
American Industry's matchless
formula is EFFICIENTLY supported by
DUBLIFE

REVERSIBLE
PLUG GAGES
"UPPCO LAPPED"

Double life of Gages for utmost Precision Service! **New** plug end. "Go" or "No-Go" ready when other end becomes worn. Change easily, quickly made. Tapered bronze collet locks plugs firmly in hexagonal handle. Saves time! Saves LOSSES!

ASK FOR CATALOG
Send for Catalog of full line of DUBLIFE. **Specify DUBLIFE Gages and UPPCO finish.** Other Gages of American Gage Design also shown. Write.

ORIGINATORS and exclusive manufacturers of DUBLIFE Gages and UPPCO Finish.

UNITED PRECISION PRODUCTS CO.
3522 W. Belmont Ave. **Chicago, Ill.**

Industrial Hygiene

Increasing use of substitute materials and new processes in war industries must be closely checked to prevent occupational disease hazards, according to E. C. Barnes, Westinghouse industrial hygiene engineer, speaking before representatives of 250 heavy industries at the recent annual meeting of the Industrial Hygiene Foundation, Pittsburgh.

Occupational disease cannot be permitted to increase, robbing the nation of valuable manpower and production time during this war. Chemists, physicians and industrial hygienists examine new operations at Westinghouse to eliminate health hazards before any change is made in the production line. New materials are frequently analyzed in the laboratory to determine whether they will have any effect upon the employes working with them. Results of this 10-year-old program were apparent in the company's experience during the first 6 months of this year, when many substitute materials were introduced because of the war.

Among 85,000 industrial workers in 23 plants and 36 manufacturing and repair shops, there were only 5 occupationa: diseases that caused lost time. Ninety-one million man hours were worked in that period and less than 1000 were lost to the war effort because of occupational ills.

Proposed changes in materials or processes are reported to the Industrial Hygiene Department by engineering and shop divisions who fully describe their plans. If the new materials are hazardous, proper protective devices or methods must be included in the new operation before it begins.

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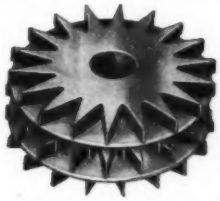
GRINDING WHEEL
DRESSERS and CUTTERS



We can supply you with the proper Dressers and Cutters for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

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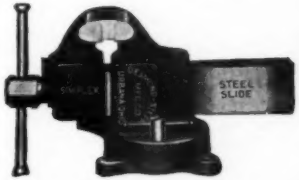
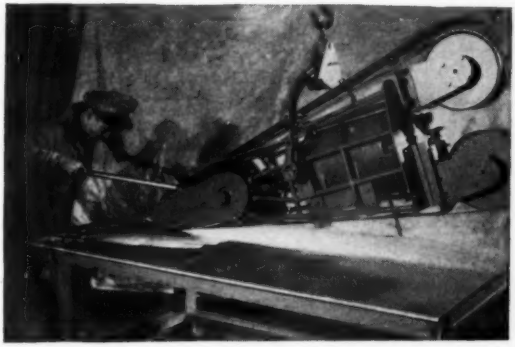


A full line of Machinists' Filers, Welders, Production and Drill Press and Milling Machine Vises.

Let us send you our vise catalog and name of your nearest dealer.

The DESMOND-STEPHAN MFG. CO., Urbana, Ohio

Jones Abrasive Belt Swing Grinder

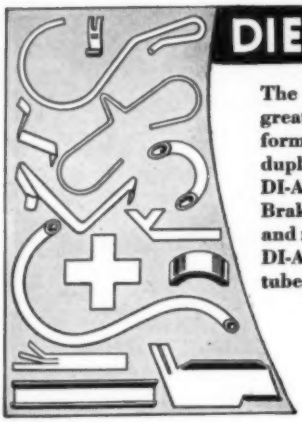


A new Jones Abrasive Belt Swing Grinder was exhibited at the recent Metal Show by Minnesota Mining & Mfg. Co., 902 Faquier Ave., St. Paul, Minn.

It is designed for the speedy grinding of steel and alloy steel plates, strip, tubes, bars, sheets and other metals where removal of much metal, and maintenance of smooth, even surfaces are necessary.

The makers point out that a conventional swing grinder, using snagging wheels, will remove much metal, but in doing so, will not leave a smooth, even surface. Portable abrasive disc sanders and grinders, using grinding wheels or cup wheels, are capable of leaving smooth, even surfaces, but such tools are slower when much metal has to be removed.

The Jones grinder is claimed to combine the stock-removing advantages of



DIE-LESS DUPLICATING

The parts shown are typical of the great variety of simple or intricate forms and shapes which can be quickly duplicated to a tolerance of .001" with DI-ACRO Precision Machines—Shears, Brakes, Benders. For experimental and research work or production runs, DI-ACRO Units form angle, channel, tube, rod, moulding, wire, strip stock; shear stock sheets; trim duplicated stampings. With DIE-LESS DUPLICATING, MAN HOURS and CRITICAL MATERIALS are frequently saved.

SHEAR

BENDER

BRAKE

DI-ACRO PRECISION MACHINES

WRITE FOR CATALOG—Send today for new 32-page catalog—"Metal Duplicating Without Dies"—giving full information on the capacity of Di-Acro Shears, Brakes, and Benders and illustrating their great variety of applications.

O'NEIL-IRWIN MFG. CO., 314 8th AVE., S. Minneapolis, Minn.

a snagging wheel with the smooth, even surface grinding features of a disc grinder, removing little or much metal and leaving a satisfactory surface.

The machine is designed for easy mounting on a trolley and I-beam. Tho it is a powerful unit, employing a 5 hp motor, it is self-balanced and easy to handle.

Controls are conveniently located at front of machine. The controls include stop and start buttons, and hand wheels for adjusting and aligning the abrasive belt.

A special arrangement of linking permits quick changing of the abrasive belt while machine is suspended for grinding. It is said that one man can change the belt in one minute.

There is said to be practically no stretch in the abrasive belts used, and it is practically impossible to run an abrasive belt off the machine, even tho grinding is done on edge of wheel. The high rate of grinding is said to be accomplished by the use of abrasive paper belts that are electrostatically coated, in combination with a special patented contact roll which the roll belt runs over at point of grinding. This contact roll has a segmental face and imparts a fingering action in grinding. The abrasive belt speed is 4500 fpm.

The machine is 5' long, 18" wide, 24" high overall. Side rotation is 30° right or left. The standard abrasive belts are 3" wide, 12'4" long. Paper belts are recommended for all flat grinding. A new bulletin gives further details.

On the Land, On the Sea And In the Air

—Is the theme of a new 20-page brochure, Flashes, No. 1042, just released by The Fostoria Pressed Steel Corporation, Fostoria, O. It illustrates and describes how good lighting and the near infra-red process are speeding production of war materials used in these phases of warfare—on land, on the sea and in the air. Copies are available from the firm.

Suggestions

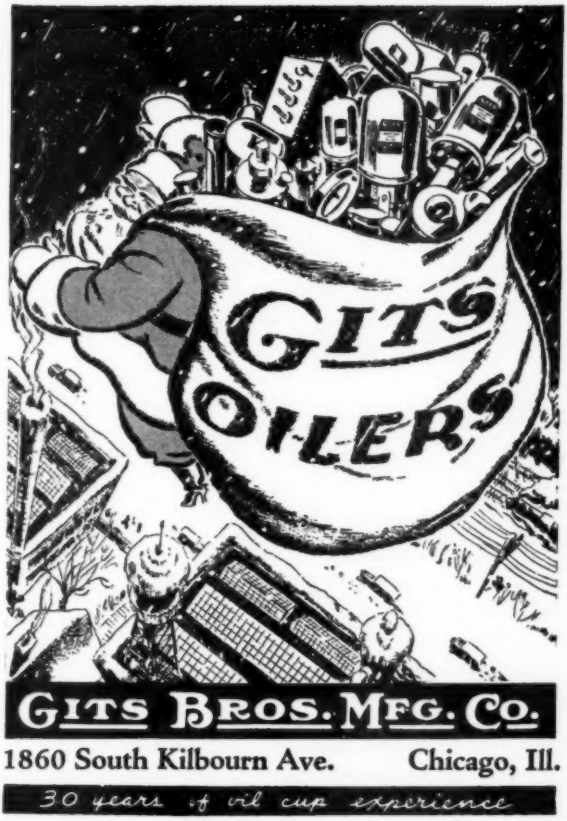
Eight thousand man-hours and more than 125,000 pounds of scarce steel will be saved because of the ingenuity shown recently by 4 war workers at General Electric Co's. main plant. The 4 men head a group of 60 employees who received awards totaling $1575 in one week recently, for suggestions which speed war production. Around $100,000 has been paid out by G-E this year for 11,000 suggestions adopted.

Howard Wildman, set-up man responsible for accurate setting of gear-making machines, received $500 for a suggestion which will save 5000 man-hours machining delicate parts for naval ordnance. Machines which he sets up turn out parts ground to tolerances of .0002". Previously, separate fixtures were made for machining each different type of part. Some had to be held in 4 different diameters to the .0002 measurement.

Wildman suggested a standard fixture which could be used in machining a variety of parts. It eliminates 5000 man-hours per year in time required in setting up machines. Before, even skilled operators had difficulty in producing the parts. Now rejections on the most troublesome part have been reduced to a new low of 2%.

Spencer Frederick, lay-out man on welded products, received $275 for a rearrangement of ship motor parts, cut from large steel sheets. It enables 25% more parts to be cut from each sheet. It will save 110,000 pounds of steel, important addition to 500,000 pounds of this metal saved by another suggestion made by him recently for which he was awarded $750. He worked out a method of "nesting" various sections so that more can be be obtained from each plate, reducing scrap.

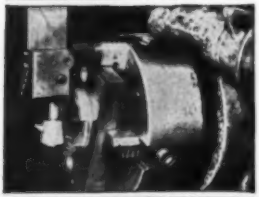
Several others also earned rewards for man-hour-saving suggestions.



4 of the many ways . . . SLOTMASTER can be used to save TOOLS & SET-UPS

Left: Set-up for cutting a spline in an adapter

Below: Set-up for cutting an internal gear

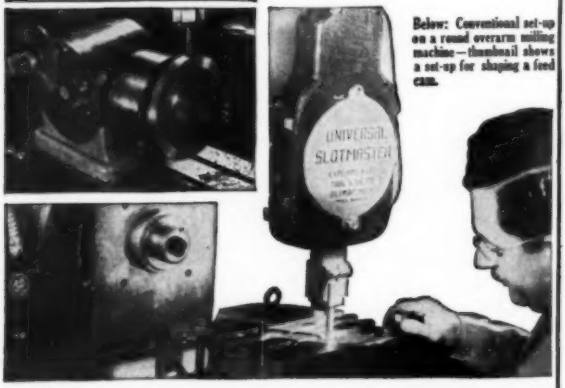


SLOTMASTER can be used on any round or flat-on round over-arm milling machine and will do precision work that normally requires a multi-thousand dollar machine (all of the working parts are of tool steel, heat treated). It takes but little time to change over from one head to the other . . the stroke of the ram is adjustable from 0 to 4" . . the speeds range from 50 to 250 s.p.m. The tool holder is of the clapper box type and can be turned in any position . . SLOTMASTER comes complete with pulleys, motor, mounting bracket, etc. Send for 4-page catalog—give specifications of the milling machines you wish to equip. Immediate deliveries on high priorities.

Experimental Tool & Die Co.

12507 Greiner Detroit, Michigan

Below: Conventional set-up on a round overarm milling machine—thumbnail shows a set-up for shaping a feed cam.



Extinguishers

Practically the entire output of approved fire extinguishers is being taken by the Army, the Navy, and manufacturers with top priority ratings, so that other users are finding it impossible to obtain new extinguishers, says Safety Research Inst., New York.

But recharging materials and replacement parts still can be purchased without difficulty. Existing equipment can readily be kept in service, with proper maintenance.

Attempts to economize by purchasing commercial grades of carbon tetrachloride for use in vaporizing liquid extinguishers are generally foiled by resulting deterioration of shell and interior mechanism of the extinguisher. Commercial grades of CTC contain water, which reacts slowly with the CTC to form hydrochloric acid, which does the damage. Vaporizing liquid furnished by extinguisher manufacturers is treated to remove all impurities and has important components added, to depress freezing point.

In soda acid and foam extinguishers, shells and all parts should be thoroly rinsed with warm water before recharging.

Simple rules for keeping extinguishers in service, indefinitely:—Place a man upon whom you can depend to see that directions are followed to the letter, in charge of recharging and inspection.—Provide him with recharging materials and replacement parts supplied by maker of extinguishers.—Give him a place to work where plenty of hot and cold water are available.—Give him tools he needs: buckets, mixing sticks, vaseline to place in the threads of the heads of the 2½-gallon extinguishers, etc.—Then, hold him strictly accountable for quality of his work, which will be reflected in continuing good performance of extinguishers. Such a policy, these days, is vital to the war effort.

"Safety"

Mark Twain once said that when he was a boy of fourteen his father was so ignorant that he could hardly stand to have the old man around. But when Mark reached 21 he was astonished at how much the old man had learned in 7 years!

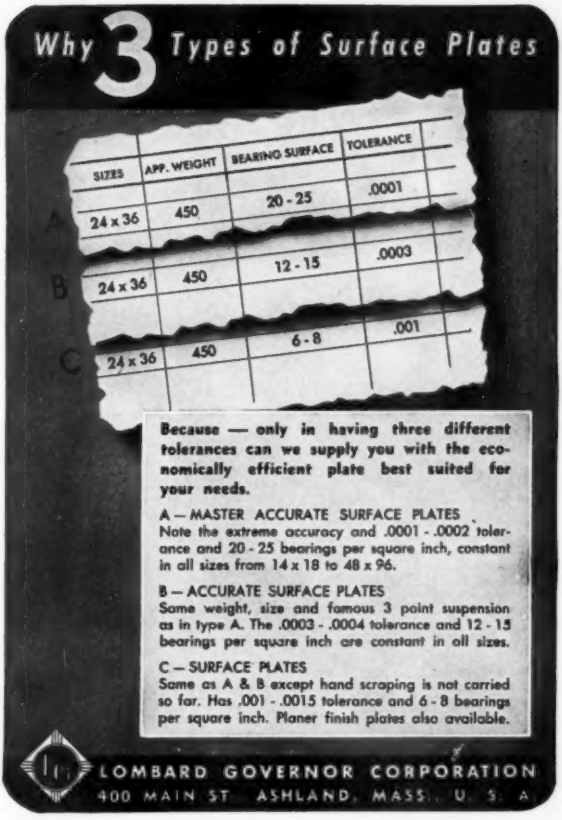
Most children seem to be like that. They figure mother and dad "don't realize that times have changed" and that their advice and discipline is out of date. Later on they look back to childhood years and are astonished, just as Mark Twain was, to find that the old folks knew what they were talking about after all.

There's a parallel with respect to the attitude of men toward Safety. An Ohio firm has found that the first-year-man is apt to be timid about his job. If he has an accident, it is probably due to ignorance, because he doesn't knowingly take chances. But the second and third year men. Ah! They're the boys who have the accidents. They have become just expert enough to like to show off. They believe they know all the answers. They take many chances.

The man of four, five, or more years of experience is more settled. He has passed thru the two earlier stages. He's seen one or more accidents or near-accidents and may have been the victim of a mishap himself. In other words, he has learned his lesson about the wisdom of safe practises.

Odd, isn't it, that a guy figures he has to learn for himself, even in matters of life and death, even when the very best of safety instruction was available to him the first day he took the job?

"Wood Products Safety"—National Safety Council News Bulletin.


Why 3 Types of Surface Plates
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BEARING SURFACE
TOLERANCE
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24 x 36
450
20 - 25
.0001
B
24 x 36
450
12 - 15
.0003
C
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.001
Because — only in having three different tolerances can we supply you with the economically efficient plate best suited for your needs.
A — MASTER ACCURATE SURFACE PLATES
Note the extreme accuracy and .0001 - .0002 tolerance and 20 - 25 bearings per square inch, constant in all sizes from 14 x 18 to 48 x 96.
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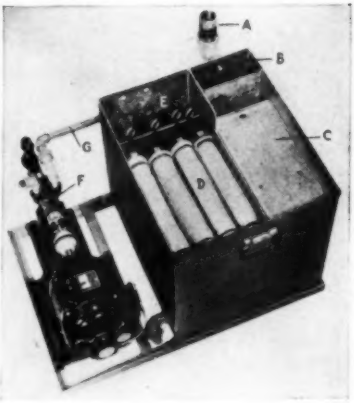
Same weight, size and famous 3 point suspension as in type A. The .0003 - .0004 tolerance and 12 - 15 bearings per square inch are constant in all sizes.
C — SURFACE PLATES
Same as A & B except hand scraping is not carried so far. Has .001 - .0015 tolerance and 6 - 8 bearings per square inch. Planer finish plates also available.
LOMBARD GOVERNOR CORPORATION
400 MAIN ST. ASHLAND, MASS., U. S. A.

Get In The Scrap

Klenzstream Filter



A new Filter for cutting oil or coolant is announced by Schurs Oil Burner Co., Oil Filter Div., 4216 Long Beach Ave., Los Angeles, Cal.

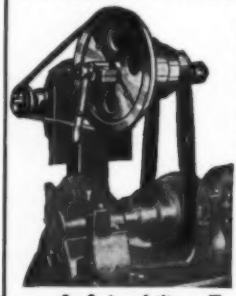
Designed to remove not only chips and coarse dirt but also fine abrasive particles and gummy oxidized, elements, the Klenzstream Filter is said materially to increase production and reduce costs of machining and other operations. A further positive gain from its use, it is pointed out, is a natural reduction of skin infections induced by razor-sharp particles of metal, usually present in the cutting oil, which, cutting into the skin when rubbed on by wiping cloths or clothing, open the way to infection.

The presence of abrasives in the cutting oil is especially disadvantageous in close limit machining. It is pointed out that rejections of precision parts are frequently due solely to extremely fine, almost microscopic, particles deposited on the work, the inspector's gauge taking no account of this condition.

Clean oil is said also to eliminate much of the dragging and clogging of tools working on soft alloys, notably collapsible taps and dies and forming tools; while it may save a polishing

STEEGE MOTOR DRIVES FOR DEFENSE GUARANTEED FOR FIVE YEARS

No chance of breakdown, doing a good job powering machines for defense production. No noise, floating cone, results 100% power. 8 years of production proof of durability. Easily installed.



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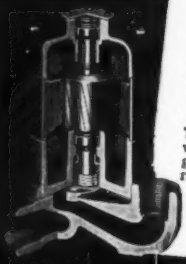
100 So. Jefferson St., Chicago, Ill.



The Coolant Pump For Every Job—

BRADY-PENROD MODEL 600

Durable! This pump stands up under hard use. Hydraulic efficiency as high as 70%. Quickly installed by any shop man at little cost and easily moved from one job to another. Controlled flow—60 g.p.h. with ⅜" tubing to 1200 g.p.h. with 1" pipe. ⅛ H.P. NEMA motor meets any demand with negligible current cost. **Tank With Built-in Baffle.** 12" x 12" heavy galvanized sheet iron with baffle separator to collect heavy chips. Painted machinery gray outside. Removable lid for cleaning without disconnecting return piping.

Write or wire today to:

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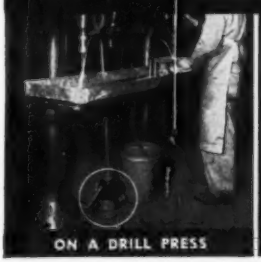
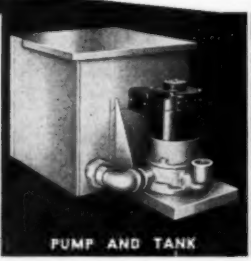


ON A DRILL PRESS



PUMP AND TANK

ON A LATHE

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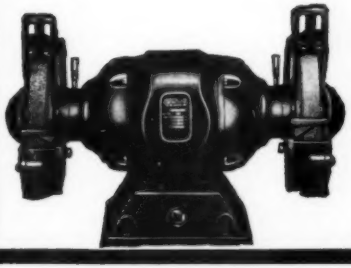
for Long, Hard Service



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ON COMPLETE LINE

Above: Baldor Special Carbide Tool Grinder, ½ h. p. ball-bearing motor, 6" Silicon Carbide wheels, **$95.00**
Ask for Bulletin 305;

At left: BALDOR No. 803, ¾ h.p. ball-bearing motor, 8" wheels; **$60.00**
Ask for Bulletin 307;

BALDOR ELECTRIC COMPANY

4368 Duncan Ave., St. Louis, Mo.

operation on drawn parts requiring a high finish. It follows, too, that cutting tools last longer, with fewer grindings, since they are not subject to wear from the action of abrasives formed by the frictional heat generated at the cutting edges of the tools.

Referring to illustration of the unit, from which top has been removed:—The used dirty cutting oil flows from the drip pan of the machine thru pipe "A" into well "B", thence into bottom of compartment "C", whence it advances upward, progressively filling a series of removable trays into which the heavy chips settle out of the oil. From here the cooled oil overflows into compartment "D", where it passes through special fabric-covered filter units which are said to remove practially every trace of foreign matter; thence thru a system of outlet valves into the clean oil reservoir "E" from which it is withdrawn for re-use thru a floating suction element by the circulating pump "F". The pump can be operated on the machine or separately; and since the oil is cleaned before passing thru pump, there is little pump wear.

The Filter is quickly cleanable without stopping machine or operation of the filter, including the low cost filter unit fabric covers which may be removed and replaced in a matter of seconds.

Wheelco Instrument Catalog

Wheelco Instruments Co., Harrison & Peoria, Chicago, has issued Bulletin Z-6100, of 16 pages, giving a condensed listing of the company's complete line of measuring and control instruments. Unit construction of temperature controllers is described and illustrated, as is the company's "electronic principle" for obtaining control without contact between measuring and control functions of the instrument. Also covered are remote controllers, combustion safeguard equipment and other instruments. Prices are given, as are numbers of complete catalog sections on each piece of equipment.

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All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest *quality* and *service* at *attractive prices.*

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Compounds **FOR DRAWING STEEL SHELL**

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Gilron

Yes, 20 mm to 105 mm steel shell can be drawn with Gilron compounds. Leading shell manufacturers report that scratching and scoring is completely eliminated.

A high film strength provides an excellent cushion between the die and shell. The film remains moist making cleaning rapid and free of surface formations.

Important to workers is the fact that Gilron compounds are non-toxic and have an agreeable odor.

Convincing list of satisfied users will be furnished on request together with complete production details. Write:

GILRON PRODUCTS CO., Inc.
1557 East 40th Street ● Cleveland, Ohio

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If you cannot carry a gun, you can at least help buy one by purchasing War Savings Bonds and Stamps.

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Brown & Sharpe Pumps

Geared, Vane and Centrifugal

Give more and better service in today's accelerated production.

Ask for Catalog on the whole line--including Motor Driven Pumps

BROWN & SHARPE MFG. CO.
Providence, R. I., U. S. A.

B·S

BROWN & SHARPE PUMPS

Jessop Steel Booklet

In designing tools, selection of proper steels is important to obtain maximum performance. Chemical analysis and visual inspection cannot tell the complete story. But careful inquiry as to definite essentials is of assistance in selection of materials upon which greatest reliance can be placed.

In its Bulletin No. 442, entitled Mogul Tool Steels, Jessop Steel Co., Washington, Pa., enumerates essentials and prescribes the various grades of its product aimed to give wanted results. The booklet should prove a valuable aid to engineers and operators responsible for tool design and production. It can be obtained on request from the firm.

Contained are complete data on analysis, physical properties, typical applications, hardness values, heat treating, welding and brazing, illustrated and amplified with numerous pictures and graphs.

PUNCH SMALL PARTS FASTER

DURO, aircraft type, punch presses are constructed to precision punch aluminum, dural, and other sheet metal and plastics. Write today for illustrated catalog on Duro Punch Presses, Bench, Milling Machines, and Accessories.

DURO MACHINE TOOLS
800 E. 61st ST. • LOS ANGELES, CALIF.

Standardized Drillmatics

D S E Machinery, 5187 E. Outer Drive, Detroit, Mich., designers and builders of machine tools, announce a complete line of automatic and semi-automatic drilling machines known as D S E Drillmatics. These machines, in 3 sizes, cover a drilling capacity of from No. 60 (.040) to ⅜" diameter drill in steel, having ¾ to 1-¼" stroke. They are of horizontal or vertical type, or a combination of both, and are of single, double, triple or quadruple spindle construction.

The machines in general consist of a substantial cast iron base with a built-in coolant pump unit, a T-slotted table for mounting of the fixtures and the automatic drilling unit proper. The drilling units are self-contained with direct motor drive and automatic cycle control, i.e., rapid advance, feed, and rapid return.

The cycle control for the units can be either simultaneously or successively arranged.

A new folder, now in preparation, will be mailed upon request.

Alloy Steel Data Sheet

A new, compact chart showing analyses, physical characteristics and applications of 19 different stainless steel, monel and nickel alloys has just been published. This also contains a handy cross reference of designations and type numbers of the Alloy Casting Institute, the American Iron and Steel Institute, American Society for Testing Materials, Society of Automotive Engineers, U. S. Navy, and others. This reference chart is standard letter size and can be conveniently filed. The Cooper Alloy Foundry Co., 210 Bloy St., Hillside, N. J., will be glad to furnish free copies on request.

Fluorescent Lamp Ballast

Announcement is made by Acme Electric & Mfg. Co., Cuba, N. Y. that the new Acme model F 100-25 lamp ballast for 4-100 watt fluorescent lamps is now in production and is available for use on industrial light-

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S & S MACHINE WORKS

HARDWARE DIVISION

4539 WEST LAKE STREET CHICAGO, ILLINOIS

HY-PRO

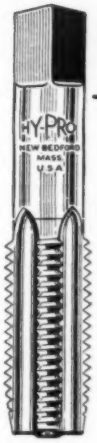
TAPS

High Speed Steel Hand & Machine Screw Taps

Cut Thread; Commercial and Precision Ground Thread Taps, Special Taps.

Clean, Sharp Threads for High Production

- BUY MORE BONDS -



HY-PRO TOOL CO.

481 Mt. Pleasant Street, New Bedford, Mass.

PRECISION BENCH MILLER

Tapered Roller Bearings

for high-speed production or precision tool room work. Tool direction adjustable to 60 degrees each side of center.

—write for catalog—

DURO MACHINE TOOLS

800 E. 61st ST. • LOS ANGELES, CALIF

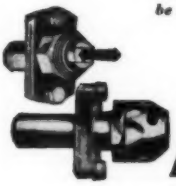
★ ★ *Save* **SCRAP** ★ ★

The country needs your scrap—steel, aluminum, brass. But it also needs your efficient production of all screw machine work. Make every piece perfect—don't waste valuable time and material—*save* scrap but don't *make* scrap.

Every Alco Tool Holder has the patented concentric alignment feature to enable you to make your set-ups quickly and accurately—to bring every drill and tap and die into exact concentric alignment with the work. Alco plays an important part in bringing old machines into the field of useful production—accurate production where every man-hour today is worth ten man-hours five years hence.

Look at the Alco line of efficient tool holders for every drilling, tapping and thread cutting operation.

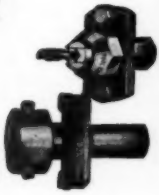
Send for the latest illustrated catalog. Alco urges you to be sure to save scrap but don't make scrap unnecessarily.



The Alco Tool Co.

252 Birdseye St., Bridgeport, Conn.

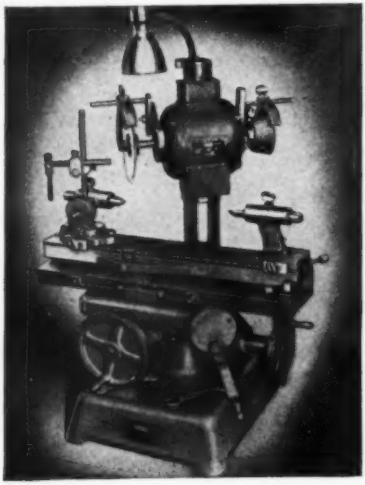
Detroit Office — 908 Stephenson Bldg.



ALCO EFFICIENT TOOLS

KNOCK-OUT

Universal Tool & Cutter Grinder



Over 1200 buyers this year testify to its merit.

Present delivery on rated orders one month.

Write or wire for bulletin TCG-42-12H

K. O. LEE COMPANY

Aberdeen, South Dakota

ing orders or replacements carrying high priority ratings. Because the use of this unit will largely be in fixtures having their ultimate use in war production plants, the electrical characteristics correspond to the majority of such applications.

The manufacturers claim that the ballast is designed to provide equalized and balanced secondary voltage to each lamp. Providing starters and switches are in good order, this would assure all 4 lamps of the unit lighting at same time.

Core and coil elements of this ballast are said to be impregnated and compounded to minimize normal resonant vibration, thus reducing the sound level to a negligible point.

The new ballast is described in detail along with other sizes of the line in the new Acme Bulletin 157—"More Light For Work."

"KEEP 'EM FLYING"

NUMBERALL

Numbering Machines

Automatic and Hand Operated

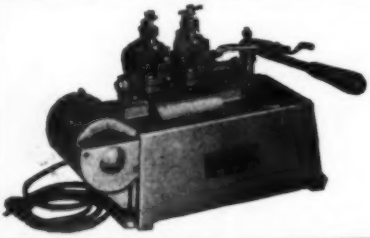
for stamping in Metal, Fibre, Plastics, etc. Do faster and better work than Single Steel Stamps.

For Marking Metal Parts, Name Plates, Metal Checks, etc.

Write for Catalog.

NUMBERALL STAMP & TOOL CO., Inc.

Huguenot Park, - - - Staten Island, N. Y.



BAND SAW WELDERS

The No. 141 Bench Type Metal Working Band Saw Welder is available with or without grinder. Work can be annealed without removing from the Welder. Band saws up to ¾" wide may be welded.

1 KVA—110 Volt—60 Cycle—single phase—5 point heat control—1 point anneal heat—Weight 40 lbs. Let us send you further details.

Mfrs. of complete line of Spot, Butt, Seam, Flash, Projection and Special Welders.

WELDEX INC., 7325 McDONALD AVE., DETROIT, MICH.

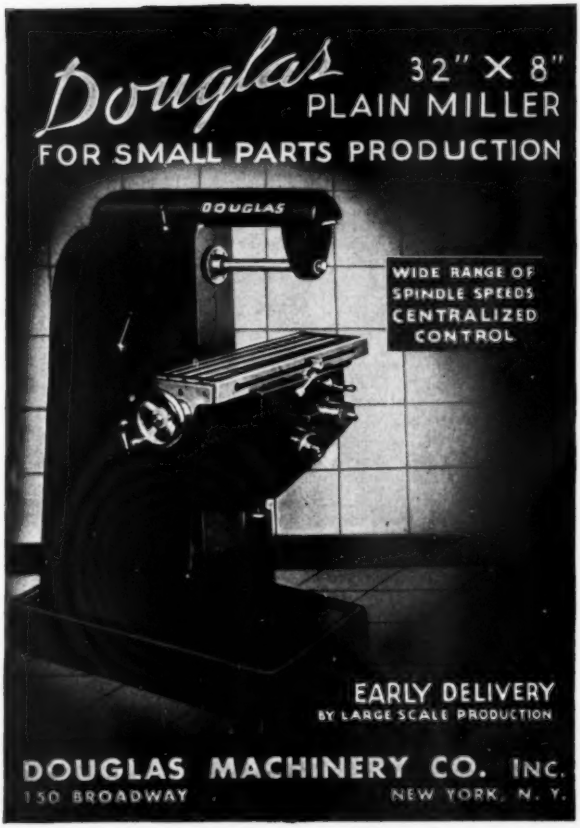
Cleanliness

Productivity of American war plants is probably the most important factor in the world today, and its protection is one of America's big problems. For this reason, great stress is being placed by health officials on the prevention of disease, as a serious threat to production.

Recurrance of the 1917-18 flu epidemic, which took ten times as many lives as the Germans, might well prove fatal to the entire effort of the United Nations. We are faced with shortage of doctors and nurses, lower temperatures in homes and offices, shortages of some resistance-building foods, overcrowded housing and transportation facilities, longer working hours, less sleep, and less woolen clothing. Only rigid precautions can prevent contagious disease from becoming serious this winter.

Cleanliness, particularly in places where many persons are mingled, is one of the most important protective measures. The Linen Supply Association of America, which supplies and services uniforms, cloth towels and other cottons for factories, offices, shops, stores and other public places, is making cleanliness the major feature of its organized effort this year. It is calling the attention of plant managers, employers, shop keepers and others to the necessity for clean clothing, hands, and equipment.

Air-borne afflictions can be combatted with precautions as to mingling with crowds in stuffy places, etc. But much risk of illness can be reduced by keeping the skin clean—especially the hands—by frequent washing and bathing. Health is a nation's greatest asset, and one which becomes increasingly important when that nation is engaged in fighting a war.

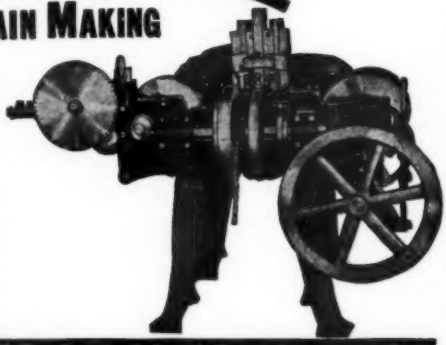


STRONG STANDARD SIZE CHAINS WITH THE NILSON CHAIN MAKING MACHINE

To make a full line of standard size chains as known to the trade, Nilson makes the four necessary sizes of machines. Chains produced by these machines are strong, durable, safe and flexible.

20% increase in strength due to the fact that the ends are tucked in, leaving them perfectly smooth on both sides, enabling one to run them through the hands without injury. They will run accurately on sprockets for conveyors or power transmission purposes.

Let us send you complete details.



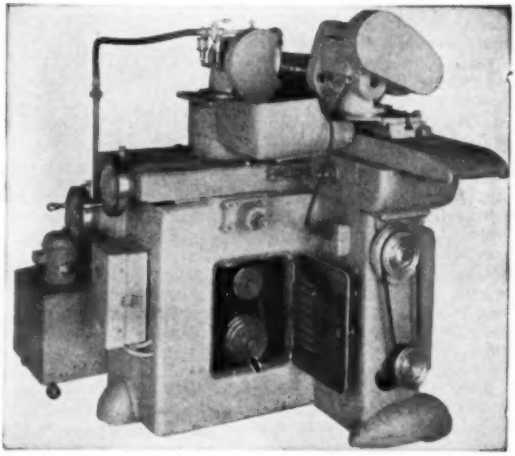
The A. H. NILSON Machine Co.
BRIDGEPORT, CONN., U.S.A.

Covel 22 Universal Cutter and Tool Grinder

Fast, flexible and precise—for today's tools—that's a brief description of the new No. 22 Universal, announced by Covel Mfg. Co., Benton Harbor, Mich.

Detail highlights include a heavy, rugged box-type bed, with table and saddle mounted directly on bed with a 3-point floor bearing. Controls are convenient and may be operated from front or rear. Sensitive control is assured by mounting of the table and saddle on anti-friction ball bearings, rolling in hardened ways.

A spindle lock is provided to facilitate changing of grinding



SAVE ON BACK WORK
WITH THE
NILSON TILTING WIRE REEL

Save back work and all useless motion with the Nilson Tilting Wire Reel.

A foot lever is tripped, the guards removed, a coil of wire slid upon the carrier, the guards replaced and set screws tightened, an easy lift, and the counter-balancing weight does the rest, bringing the tilting section to an upright position, ready to feed the wire into the machine. Simple in operation, and may possibly save your men from sprains, resulting in lost time and production.

Send for bulletin No. 51 and learn how to save in other ways too.

The A. H. NILSON Machine Co.
BRIDGEPORT, CONN., U.S.A.

wheels. Incidentally, a spring-loaded, large size ball bearing cartridge-type spindle is provided.

Table, saddle and vertical adjustment can be locked after setting.

Three speeds are provided thru V-belt drive, readily accessible for quick change. Each belt is independently adjustable for tension and belts never twist.

The grinding wheel motor is enclosed in the base—out of the way of grinding operations. Complete dust protection is provided on all wearing surfaces and the vertical column has telescoping metal guards. All attachments are aligned from edge of the top table. The table has a fine screw adjustment for taper. By revolving top table 180°, maximum distance from table to spindle is increased 3", giving increased cross feed capacity. Hand rapid cross travel to saddle can be provided at extra cost.

A swing-type adjustable micrometer stop to limit forward travel of saddle for ease of inspection and accurate infeeding, is also available as an extra.

Another useful extra is the power table feed. A reversing motor is used, providing 3 speeds thru a V-belt.

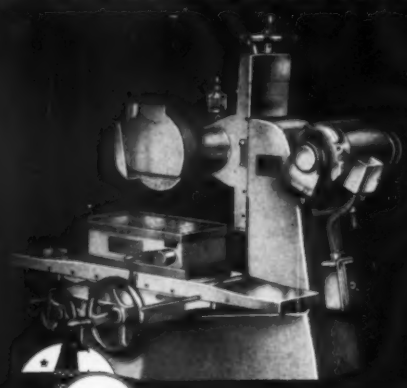
A wet grinding attachment is also available at extra cost, with splash guards, hoods, piping and tank complete.

A large assortment of attachments may be had for performing a wide range of grinding operations.

As the bearings are mounted in quills, the entire spindle unit may be removed from housing. Labyrinth seals all-around prevent entry of dust. Each bearing is lubricated by a sight wick feed glass oiler. Left hand end of spindle is tapered to receive grinding wheel collets while right hand end is straight to accommodate small diameter cup grinding wheels. Collet for 1¼" bore grinding wheel is furnished to mount on this end.

Longitudinal travel of table is 24"; vertical movement of grinding wheel spindle is 7½"; cross movement of saddle is 8"; swings work 10⅜" in diameter; swings work with right and left hand tail stock 30" long; with 3-

TO-MORROW.



TOMORROW you must make deliveries! Delivery dates are becoming increasingly hard to meet and every tool in your plant must be kept keen to maintain peak production.

CARBIDE tools have been a tremendous factor in the Defense Program, but high efficiency in carbide tools is dependent upon grinding. The GRENBY S-1 Surface Grinder is used extensively for carbide tool grinding. For this work it has no equal.

These features combine to give a perfect grind on carbides:

- . . . smooth cable feed, no chatter
- . . . spring loaded counterbalanced spindle
- . . . precision spindle accurate to .0001
- . . . simplified set-up
- . . . optional accessories

THE GRENBY line also includes Internal, External, Flute and Cutter Grinders.

Send for the Grenby Catalog

★ ★ ★

GRENBY MFG. CO.

PLAINVILLE, CONNECTICUT

speed headstock and right hand tailstock 24" long. Face mill capacity with universal face mill over table is 10" diameter; over sub-table 18" diameter; with Standard universal attachment over table, 16" diameter; over sub-table, 24" diameter. Table surface is 5½x42". Height, floor to table is 41". Grinding wheels, 8" diameter x ½" face x 1¼" hole. Main spindle motor, ¾ hp, 1750 or 1425 rpm; power feed motor, 1/6 hp, 1150 or 1425 rpm, reversible; headstock motor, 1/6 hp, 1150 or 1425 rpm. Floor space, 57x89".

An attractive new 20-page bulletin (No. 1042) presents many illustrations of the machine, attachments and typical applications.

Lighting Phosphor Conserves Metals

For use in coating fluorescent lamps, a new phosphor which produces more light and uses no cadmium or lead has been developed by research engineers of the Westinghouse Lamp Division, Bloomfield, N. J.

In the fluorescent lamp, the phosphor's function is to transform invisible ultraviolet rays into visible light radiations. The new phosphor, already being used in production of Westinghouse Mazda fluorescent lamps, has been found to maintain a high light output in the lamps, yet permits the elimination of cadmium and lead, 2 materials essential in the war effort.

Westinghouse research engineers discovered that the lamp's light output could be increased by minute changes in the percentage of the activator element. This new mix produces substantially more light than the previous mixture that contained critical materials.

AMERICA NEEDS SCRAP

Scrap is vital to the war effort. One pound of scrap helps make two pounds of tough fighting material—it may go into tanks, guns, shells, jeeps or some other vital engine of war.

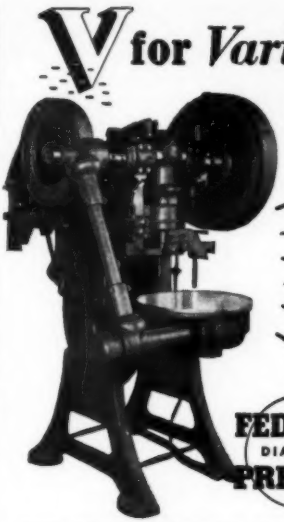
THROW YOUR SCRAP INTO THE FIGHT!

Bandsaws

Speed attained in production at many points thru the use of bandsaws for various rough-cutting operations has been much farther extended of late years, thru the use of high speeds on the blade, and special bandsaw blades to withstand these high speeds. In the case of cutting light-weight structural shapes, moldings, and sheets thinner than 16 gage, high speeds, approximating 4,000 fpm, are especially recommended. Manufacturers of metal cutting bandsaws, in some cases at least, are prepared to furnish blades for slow speed machines, to run at 200 fpm or less. Such firms will offer specific recommendations for different types of materials, when desired. . . . especially, furnish them with the kind, shape, size and hardness of the material to be cut, and the speed at which the machine runs.

Not long ago, there was noticed a bandsaw, engaged in cutting angle irons, which could be tilted to cut the work at a miter, while the work itself was supported on a level bed and held in a stationary quick-action vise. The arrangement on this machine was such that the blade was fed into the work while the latter was stationary. The value of such operations in connection with welding can hardly be estimated in considering fast structural work. Wherever a cut on a piece of material lies wholly within one plane, this method of cutting is certainly worthy of consideration as against torch cutting of structural steel.

Incidentally, this is a point which designers of structural steel work will do well to hold in mind.



V for *Variety* of jobs they can do

★ Burnishing
★ Forming
★ Marking
★ Staking
★ Assembly
★ Combinations

FEDERAL DIAL FEED PRESSES

FEDERAL Dial Feed Presses are now performing many jobs which formerly were not thought of as press operations — primary, secondary, and assembly work; in some cases, intricate combinations of all three. Burnishing, forming, staking, and high speed marking are handled with ease. Versatility is practically unlimited. Fast, safe, smooth and precise, these presses are speeding war production in hundreds of plants. Write for literature today.

THE FEDERAL PRESS CO.
811 Division St., Elkhart, Indiana.

9 FEDERAL SIZES
Federal Open-Back, Inclinable Presses are available in nine sizes, with capacities ranging from six to 80 tons—either flywheel or geared type. They are the products of 40 years' experience in press building.

NO. 1 HEAVY DUTY GEARED HEAD HAND MILLER

Available with Longitudinal Power Feed to Table

Table: 6"x24"
Capacity 5½"x8½"x18"

Geared Spindle Speeds — 6 forward, 6 reverse. Optional spindle speed ranges available. 150-675 r. p. m.; 200-900 r. p. m.; 350-1350 r. p. m.

Anti-friction speed and spindle assemblies.

Built in coolant pump and piping. Motor in base.

PROMPT DELIVERIES

ATLANTIC MACHINERY CORP.

149 BROADWAY, NEW YORK, N. Y.

Exhausting

Two different phases of the metal-working industries call for careful exhausting. One of these is in the case of abrasive dust in the air, as in the case of grinding, polishing and buffing operations. The other has to do with the removal of fumes encountered in certain cases. Both phases have definite bearing on health of employees. We cannot afford to neglect them.

Touching on removal of either dust or fumes, it is better to have a firm that has had extensive experience with exhaust systems plan such a system, adapted to the particular plant where it is to be installed, and give an estimate of the work involved. Grinding, buffing and polishing wheels should be as closely hooded as possible, in order that as little as possible of the abrasive dust may escape. Some firms making such installations, feature adjustable hoods. In plants where a great many grinding, buffing or polishing machines are used, it is wise to plan the machine layout with particular reference to the exhausting system. Some of the most extensive departments of this kind to date have been in the automobile industries.

Removal of explosive fumes, which come from chromium electro-plating tanks, exhausting fumes from metal pickling vats, and removal of smoke from forge fires, all fall within the realm of the practical exhausting system. Each of these instances presents problems peculiar to itself. Also, there are paint spray booths to be served, and in many cases the air being handled from these booths is quite highly explosive and must be treated accordingly. Such equipment is readily available.

Now-a girl operator can do that job with a Colwell Turret

An inexperienced operator can quickly change from one tool to another with our four tool post turret. Positive locking device—quickly and accurately indexed.

Send for new folder.

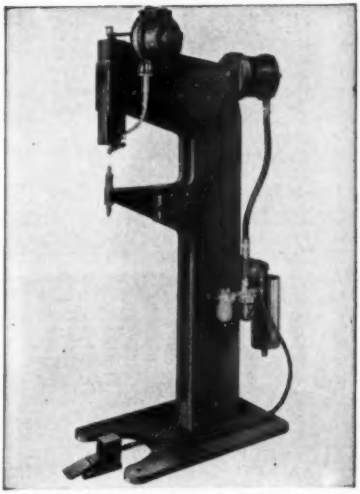
S.G.Colwell 25 Congress Ave. Prov. R.I.

T-J Air Powered "Rivitor"

Designed to afford increased speed and efficiency of flush riveting in aircraft production, the new "Rivitor" manufactured by the Tomkins-Johnson Co., Jackson, Mich., is air powered with automatic feed and setting mechanism.

Its simplified construction permits use of less critical materials, and requires fewer parts. Pressure for riveting is furnished by an air cylinder. Air pressure from cylinder is applied (and stepped up) thru a toggle mechanism. It is explained that this type of construction is made possible by designing the machine to handle exclusively, aircraft requirements for aluminum alloy riveting, with capacity for rivets ¼" diameter x ¾" long.

By using a different type of rivet set and rivet jaw construction, this machine can also be adapted to handle counter sunk head, round head, full and semi brazier head rivets. It is available in throat depths ranging from 9 to 36".



Other features of the "Rivitor's" de-

Allen Power Bench Type Punch Press

A Small punch press for small work.

Height 17½". Base 8½x8½"
Flywheel 10" D. Wt. 28 lb.
Stroke ¾"
Capacity soft iron ¾"Dx⅛"
Weight 120 lb.
Power required ¼ to ½ H. P.

Price $125.00

Circular on request.

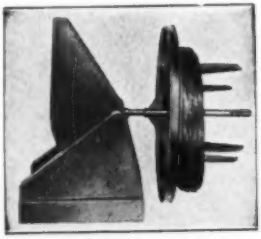
Alva F. Allen, Clinton, Mo.

SPEED PRODUCTION -

INSURE SAFETY WITH SHIFTWEIGHT

WIRE REELS

Husky, welded steel construction with a capacity to handle up to 300 pound wire coils with coil arms adjustable from a minimum inner coil diameter of 10" to extreme diameter of reel. Shiftweight is snarlproof and easily handled by one man. Operates smoothly and will give years of trouble-free service. Immediate delivery from stock.



Write for folder giving complete details.

MOSLO MACHINERY CO.
2443 PROSPECT AVE. CLEVELAND, OHIO

sign include precision setting . . . upper and lower toolings are accurately aligned . . . vertical adjustment of lower tooling can be accomplished without disturbing this alignment; adjustable setting tools . . . common variations in thickness of materials being riveted are handled automatically . . . major variations are compensated for thru manual adjustments provided; interchangeable horn type construction . . . horn section holding lower tooling may be removed and replaced with horn section from any other RP or RS interchangeable horn type "Rivitor" . . . measurements are accurately held in order to make this possible.

Aircraft Product Development

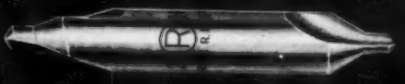
Announcement has been made of the formation of the Aircraft Parts Development Corp., with offices, laboratories, and shops in Summit, N. J.

This organization will handle research and development work on parts and materials for the Aircraft Industry, especially in the fields of fastening devices, powdered metals, and plastics. It is planned to solicit ideas and untested projects from engineers and inventors, and to carry them thru complete development to the point of release for commercial manufacture. The activity will extend to the designing and tooling of any special machinery required for the manufacture of products evolved.

Facilities include a fully equipped tool room, special experimental machinery, a powdered metal experimental laboratory, and a pilot thermo-plastics plant. Executive and technical personnel of the organization will be announced shortly.

COMBINATION CENTER DRILL

TRADE (R) MARK



Special Alloy and High Speed Steel. Ground with Radial Relief. Will give more production at less cost. Write for catalog.

CIRCULAR TOOL CO., INC.
767 ALLENS AVE. - PROVIDENCE, R. I.

Chicago - Philadelphia - New York - Dayton - Cleveland - Syracuse - Indianapolis - Detroit - St. Louis

Locating

There are various methods of spotting or locatign. But in cases where a round-end member, or one having a true square or polygonal section, is to be located quickly and accurately, the bell-mouthed cup is perhaps the most convenient device to be found. Bell - mouths have, in consequence, been considerably used when such problems arise. One application that is very interesting consists of using a bell - mouthed "finder" for bringing the driving bit of a portable screwdriver into immediate concentric alignment with heads of screws to be driven, so that the bit finds its way into screw-slots at once. Such bell-mouthed finders have been supplied by leading makers of this type of screwdriver. There is no danger of marring finished work when they are being used, as slippage is prevented.

Where a piece of material is of regular section, with the end introduced into an accurately-formed bellmouth, until it reaches the stopping point, center of material will always be accurately aligned with center of the bellmouth. Since this is so, the bellmouth furnishes a means of quickly centering stock. This is found highly useful in centering machines. When you are producing parts in turret lathes or automatics, later be ground to final finish, you can get along with a much smaller grinding allowance, if you use a good centering machine between the turning and grinding operations. One such machine carries a number of different sized bellmouths for centering different diameters of work. With the end of the workpiece in the bellmouth, the centering tool advances along the bellmouth axis to produce the cut in the end of the work. The machine will center cold rolled material accurately, as well.

FLOATING HOLDERS for Screw Machines

•

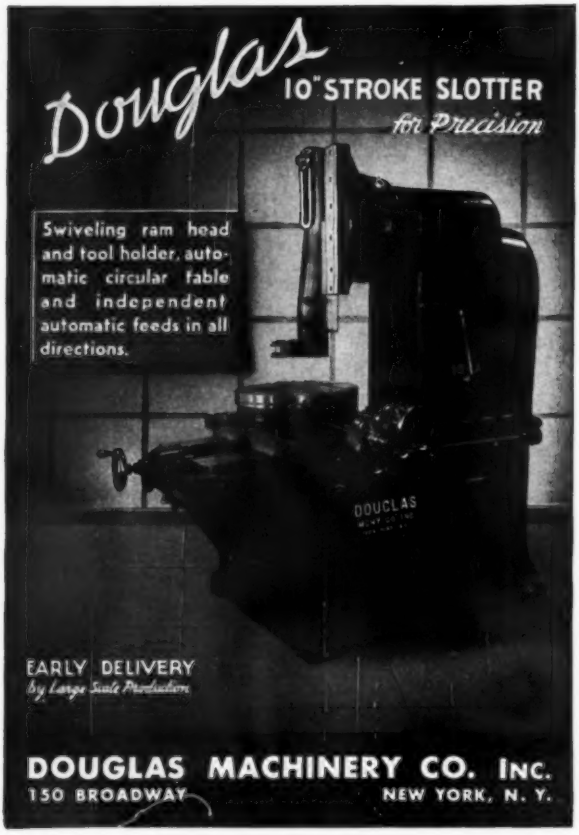
Now Available for
IMMEDIATE DELIVERY
(In Stock)

	Our No.	
B & S No. 00	No. 1	$6.00
B & S No. 0	No. 2	6.25
B & S No. 1	No. 3	7.95
B & S No. 2	No. 4	8.65

Made of forged Steel
as developed by our Engineers

(Designers and Builders of Fine Machine Tools)

AJAX ENGINEERING & MFG. CO.
MANUFACTURERS OF HALCO PRODUCTS
14230 BIRWOOD AVE., DETROIT, MICH.


Douglas
10" STROKE SLOTTER
for Precision
Swiveling ram head and tool holder, automatic circular table and independent automatic feeds in all directions.
EARLY DELIVERY
by Large Scale Production
DOUGLAS MACHINERY CO. INC.
150 BROADWAY
NEW YORK, N. Y.

Blackout Bulb

A new blackout bulb which can be kept burning for emergency lighting without need of window shades or blinds, has been approved by the War Department and is now ready for use in war plants and government buildings thruout the nation. This was announced recently by D. W. Atwater, manager of commercial engineering, Lamp Div., Westinghouse, Bloomfield, N. J.

The new bulb gives a faint glow of orange light sufficient clearly to distinguish objects in a room but not enough to be visible from the air, even tho placed directly in line with an open window. In war factories, the bulbs will be installed along manufacturing aisles, on stairways and in halls. During a blackout, the light enables workers to move about safely, switch off machinery or perform any other simple emergency operation. Altho the bulbs are now available only on high priority ratings, WPB may permit their civilian use in sections of the country defined as blackout areas. This would make the bulbs available for homes, office buildings, stores, hospitals, railroad stations, trains and wherever some visibility is essential in spite of blackout conditions prevailing.

Resembling in appearance the familiar household light bulb, the blackout lamp is coated with an outer covering of black, except for an orange-red opening thru which a narrow beam of light passes. The downward direction of this beam prevents any direct rays of light from being seen by planes. Operated at 15 watts, each bulb will provide emergency lighting for an area of approximately 200 square feet.

The ONLY Machine Using HIGH SPEED BLADES

for High Carbon High Chrome Steel up to 3 Inches Thick

FOLEY DIE MAKER

Handles most intricate dies with small holes and sharp corners, as only smallest lead hole through which saw or file can pass is necessary. Compound angle filing is fast, accurate and easy with the Foley Die-Making Machine. Adjustable table tilts 20° front, 10° back. Ram tilts 20° right or left. Has 6⅝" throat—saws to center of 12¾" piece.

USES ANY STANDARD OR SPECIAL FILES—From the smallest needle file to the coarsest bastard file can be used in this machine without any special holding fixtures.

TAKES ANY SAW—Any type of saw from the finest saw to the high power high speed saw can be used without delay of changing holding fixtures. No holes in blade necessary.

PAYS FOR ITSELF—The Foley Die-Making Machine usually pays for itself in 400 working hours. Write today for literature and full details.

FOLEY MFG. Co. 28 Main St. N. E. Minneapolis, Minn.

Manufacturers of Foley Automatic Saw Filers, Grinders, etc.

Lincoln Milling Machine

A sturdy new milling machine, designed for use with high speed milling attachments, is announced by the Lincoln Machine Specialty Co., 135 So. La Salle St., Chicago, Ill.

For tool room or production, when equipped with a standard high speed detachable milling head, it is intended to provide a high precision, large capacity unit to release heavy, power-driven milling equipment for other work.

The machine is unusually massive and rigid, weighing without head, 2300 lbs. The table is exceptionally large, 10x42", permitting cuts up to 30" long. Sensitive, accurate hand operation is assured thru use of 10-pitch longitudinal and cross feed screws and tapered gibs.

Rugged construction of the base, table, knee and ram make for extremely accurate precision work.

SHARP TOOLS AT LOW COST

Hack Saws, Band Saws, Metal Slitting Saws and Circular Saws may be sharpened quickly and accurately on a H-L Automatic Saw and Cutter Sharpener. Girls run these machines.
Save your dull blades. Make them good as new at little expense.

SHARP TOOLS— MORE PRODUCTION
Circular—
HOWE & SON, Inc. Hinsdale, N. H.

WHITNEY-JENSEN PRODUCTS
30 YEARS EXPERIENCE

AIRCRAFT RIVET SQUEEZERS

25 SIZES

Standard, Alligator, Crab, Snake Head, and Pelican types for handling aluminum rivets up to 5/32" size. Pelican type (shown) in sizes from 1¾" to 6" throat depth, other types in a total of 25 different sizes. Widely used in aircraft industry and by subcontractors. Write for new Whitney-JENSEN Aircraft Tools Catalog.

WHITNEY METAL TOOL COMPANY
111 FORBES ST. • ROCKFORD, ILL.

Bearing surfaces on the column face are broad and widely spaced.

Longitudinal feed is 30"; cross feed, 10"; vertical feed is 15"; overall working surface of table is 10x38"; minimum dimension, center of overarm to top of table is 7½"; maximum, 23" adjustment of overarm, in and out is 16"; distance, floor to center of overarm is 54"; distance from floor to top of table in high position is 47"; in low position, 32"; center of overarm to end of spindle varies with type of head used, from 5-9"; diameter of overarm extension is 3½"; longitudinal lead screw is 1¼"-10; vertical lead screw is 1-⅝"-5; cross lead screw is 1¼"-10.

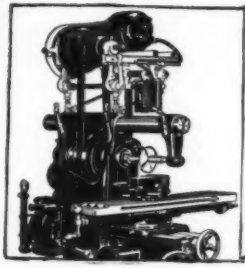
Dust Engineering Handbook

Defining Dust Engineering as that branch of applied science which deals with the origin, nature and characteristics of small, solid, air-borne particles called dust, and development of methods for its control and elimination, American Air Filter, Co., Inc., 312 Central Ave., Louisville, Ky., offers an excellent booklet on the subject.

Those with responsibility of solving industrial dust problems will find the booklet an important treatise on the part of the firm, which, for the past score of years, has specialized in this field. Its aim is to illustrate wide application of AAF products in industry with 10 of the more general industrial dust problems. There are, of course, many other dust problems individual to specific industries, or resulting from different processes. But the 10 discussed, says the firm, serve to give an insight into the general problem, as well as AAF's experience, background and methods of coping with them.

Beginning with Industrial Dust Problems, the book treats of the various kinds, atmospheric, process, etc., and follows with methods for industrial air conditioning, ventilation, drying operation, product finishing, control of bacteria and mold spores, with a section devoted to protection and maintenance of engines and compressors.

It is well illustrated with charts and micro-photos, making it a valuable reference in the engineering library.



The drive operators like

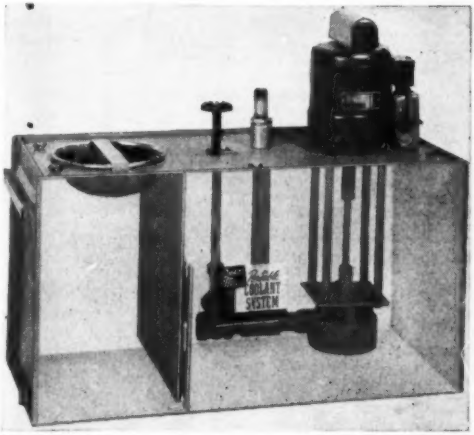
Shifting speeds is an easy, quiet, operation with a Remco Drive. No ear-splitting clash of metal-on-metal. Instead the motor takes hold gradually, silently, by slipping the belt—simple friction-clutch action. Tool need not be removed from cut in most instances. Less down-time! More out-put! Earn your operator's gratitude, do yourself a favor, install Remco Drives. Remco Products Corp., State St. at R. R., York, Pa.

REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

Gray-Mills Model G-10A Portable Coolant System

A new portable coolant system being a centrifugal pump, designed to deliver controlled coolant flow from 10 to 1,000 gallons per hour, is announced by Gray-Mills Co., 215 W. Ontario St., Chicago, Ill.



Designated Model G-10A, the new unit supplements 2 other model series in the company's line of portable coolant systems. Other models are gear pumps and deliver 50 to 165 gallons of coolant per hour.

The new unit provides large coolant volume and high flushing capacity, making it particularly applicable for multiple spindle and deep drilling work, drill press installations, large cut-off machines, large grinders, large milling machines, large turret lathes, and as a stand-by unit for central systems.

NEW LOW COST

DRILL GRINDER

Anyone can do expert drill grinding with this simple-to-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time and materials that dull bits waste. Grinds bits from 3/16 to 1½. Write for FREE literature.

T & H MFG. CO.
811 E. 31 St.
Kansas City, Mo.

New UNIVERSAL

PORTO-HOLDER

Saves time and money wherever portable power tools are used for bench assembly.

Here are the reasons why:
Speeds up production, stops costly tool breakage, eliminates worker fatigue, and is adaptable to any tool. Very simple and efficient, compact and rugged, complete versatility and requires only 5 minutes to set up.

Write for further details

John Nielsen Engineering Co.
South Beloit Illinois

The ANGLE COMPUTER

A time-saving, labor-saving instrument designed to simplify the layout of die work!

Three individual directions of rotation.

Locates to 1/1000th of inch!

For machined parts, for castings in survey stage, for finished precision parts ready for inspection. Part is clamped to surface plate—every angle or compound angle can be checked. Accurate, guaranteed. Two sizes—surface plate—one 4½"x9", the other 9"x16". Write for complete information.

The ANGLE COMPUTER CO.

5720 Melrose Avenue, Los Angeles, California

SPEED UP YOUR . . . RIVETING OPERATIONS

A great help in War Production, these **Grant** Riveters are available in Noiseless Spinning and Vibrating Hammer types, also Vertical and Horizontal Multiple Spindle Spinning Machines. *Information? Write!*

The Grant

MANUFACTURING & MACHINE CO.

C. E. Station, Bridgeport, Conn.

The centrifugal pump is a high stress casting, with sleeve bearings. Intake orifice is 1¼"; discharge 1". Both 1- and 3-phase ¼-hp motors, 110/220 or 220/440 volts respectively, are available. The tank, of 40-gallon capacity, is 16" deep, 16" wide, and 36" long. Double baffle plate provides forced settling, and a separate filter screen in the tank cover is easily removed for cleaning. Tank finish is corrosion resistant. Flow control valve is easily accessible.

Model B Box Tool

A new Boyar-Schultz Screw Machine Tool is designed to take heavy

cuts with sustained accuracy. It has a swiveling tool bit and separately adjusted rollers which are said to facilitate delicate adjustments. Its rigid construction and generous space for chips and coolant, should be important factors in producing quality finished parts to close tolerance.

The manufacturers are Boyar-Schultz Corp., 2108-M Walnut St., Chicago, Ill.

BURR KEYSEATERS

Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON

429 Kent Ave., Brooklyn, N. Y.

Vernon
6" UNIVERSAL INDEX CENTERS

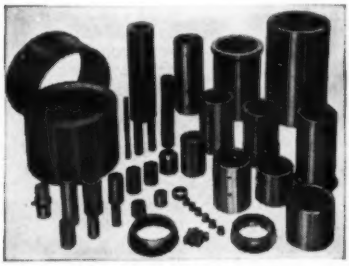
Head swivels and locks from 10° below horizontal to 10° past perpendicular. Spindle taper #9B&S. The 3 index plates provided will divide all numbers to 50 and all even numbers to 100 (except 96T).

Write for bulletin.

MACHINERY MANUFACTURING COMPANY
Vernon Line of HORIZONTAL MILLS, VERTICAL MILLS and JIG BORERS, SHAPERS and GRINDERS

Moulded Fabric Bearings

Shortage of critical bearing metals is said to be overcome and performance results improved thru use of Oil-Lubricated Non-Metallic Moulded Bearings, developed by the Gatke Corp., 228 N. La Salle St., Chicago.



Known as Lubritex Bearings, these are distinctly different from Hydrotex (water-lubricated) and Grafitex (self-lubricated) Bearings in that they are made of various material combinations developed especially to meet all kinds of service conditions using grease or oil lubrication.

According to the manufacturer, Lubritex Bearings are replacing conventional bearings with highly satisfactory results on all kinds of service. They are said to stand up under impact loads that are too great for metal bearings—have much greater wear life and lower friction. Lubrication is much less critical—they do not score journals, even if lubrication fails for limited periods.

These unique non-metallic bearings are engineered for the application and moulded to finished dimensions in all shapes and sizes for replacing metal bearings. Performance results on a wide range of service conditions are described in a recent catalog.

SAVE TIME when time is short

TOOL POST TURRETS FOR ALL LATHE SIZES
Saves in Setting Up — Saves on Repeat Operations
WRITE
C-W-C CORPORATION
HAWTHORNE, CALIFORNIA

Buy U. S. War Savings Bonds and Stamps

For War Production
KARELSEN'S DIAMONDS KEEP THE WHEELS OF INDUSTRY TRUE

¼ KT. TO 10 KT.
SEND FOR PRICES
SPECIFY HOLDER
IF ITS MADE OF DIAMOND—ASK US FIRST
IMMEDIATE DELIVERY

DIAMOND POINTED EMERY WHEEL DRESSERS
AND DIAMOND TOOLS FOR EVERY PURPOSE.

SALESMEN WANTED
Big demand for our products. State qualifications fully. All information in confidence—Write—Some territories still available.

E. KARELSEN, INC. Tel. VAN. 6-5888 58 W. 45th St., N.Y., N. Y.

The Jackson No. 2 Verticle Milling Machine, ruggedly built of quality materials, will prove indispensable for Tool Room or Production applications. 5 speed V-belt drive, sturdy 4¼" quill and ¾" spindle capacity 8" x 32" table.

JACKSON
MACHINE & TOOL COMPANY SALES DIVISION
956 Roberts St. Jackson, Michigan

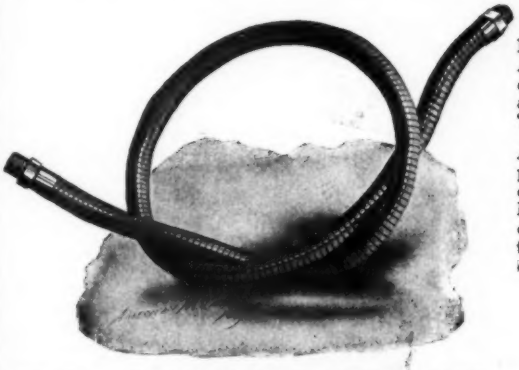
Joseph Henry

This year marks the 100th anniversary of announcement by Joseph Henry (1797-1878) of the oscillatory nature of electrical discharges, according to Ohmite (Mfg. Co., Chicago) News. Before 1832, year of his joining the staff of Princeton University, he had produced an electromagnet. in his experiments with insulated windings. At Princeton, he began to investigate secondary currents—momentary increase in current, when an electrical circuit is broken—reported, also, by Faraday.

Using coils of silk-insulated wire and helices, he found that extra current from them varied in intensity and quantity. With a feeble source of current the largest coil, when the circuit was broken, gave "the most brilliant deflagration and the loudest snaps from a surface of mercury." The shocks, however were very feeble. Current produced was one of quantity. When a battery of several cells was used with one of the wire helices, the indications of quantity were slight; but the shock obtained was considerable, showing a current of "intensity".

It occurred to him to test the secondary current to see if it would induce a current in a 3rd circuit. In the test, a current giving intense shocks was developed in the 3d circuit. To see if the same results would follow from "ordinary electricity" (static) he wound 2 opposed spiral strips, inside and outside of a glass, and passed a discharge from a Leyden Jar thru 1 winding. Discrepancies in direction of the induced currents, indicated by a magnetic needle, proved "the existence of a principal discharge in one direction and several reflex actions, backward and forward, each more feeble than that proceeding, until equilibrium is obtained"—a hypothesis which was one of Henry's greatest contributions to electrical science, and one of great importance, today.

FLEXIBLE STEEL TUBING



The recognized standard for use on Milling Machines, Automatic Screw Machines, Turret Lathes, and other Machine Tools.

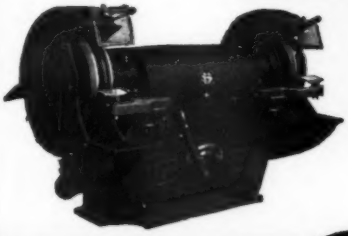
Adapted for all purposes for conveying cutting oil and other liquids. Manufactured in sizes from 1/8" to 1/2" inside diameters.

Write for bulletin No. 637

T. R. ALMOND MFG. CO. **ASHBURNHAM, MASS.**

SNAGGING GRINDER
Model 65

The four-speed gear-drive transmission enables you to *maintain efficient peripheral speed down to the flanges.*



Hand lever changes speeds quickly. Electric interlock prevents operation unless gears are in mesh.

for vitrified or high speed wheels

BUY WAR BONDS AND STAMPS

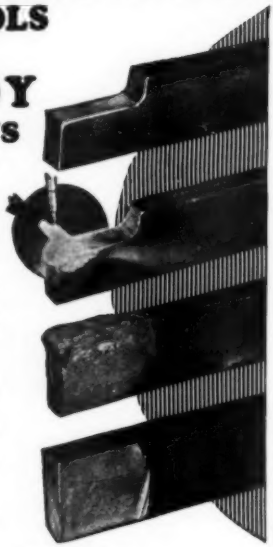
THE UNITED STATES ELECTRICAL TOOL CO.
THE GOOD MECHANICS CHOICE
CINCINNATI, OHIO, U.S.A.

MAKE YOUR OWN
CUTTING TOOLS
with the new
COLMONOY
WCR ALLOYS

Bridge the gap between high speed steel and the carbides. Reclaim old, and make new cutting tools by welding. The process is simple.

To fabricate a typical tool—

1. Undercut carbon steel shank, leaving a fillet for ease in welding.
2. Fill undercut, using ordinary hard facing welding procedure.
3. Hot wipe, to approximate shape, to save grinding.
4. Wet grind, using green silicon carbide rough and finish wheels.



WRITE FOR LITERATURE

Immediate delivery of all grades of W C R Alloys at all branches.

WALL-COLMONOY CORP.

720 Fisher Bldg., Detroit, Mich.

Branches in New York City, Blasdell, N. Y., Chicago, Tulsa, Los Angeles, and in Canada

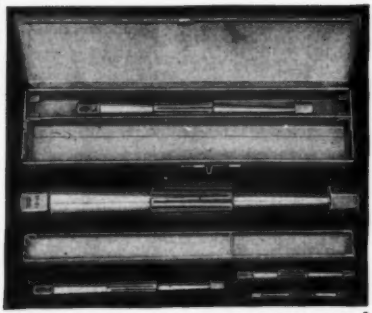
Chain Drives

So important are various types of chain drives, that many firms make a business of manufacturing driving chains. Various styles of link and of riveted chain have been developed by specialists for many different services. A study of different kinds of chain available will be a revelation to many.

Important to machine designers in many cases is roller chain. It solves driving problems which are otherwise almost impossible of solution. For roller chain is alike on both sides. For that reason it can be run over the top of one sprocket, under the next sprocket, up and over the next, etc. This makes it easy to turn a number of machine rolls or other elements in opposing directions with the same drive. There are a number of makers of high-class roller chain drives. All maintain engineering departments, ready to help the individual customer or the individual machine designer with his problems.

Silent chain, so-called, is designed to be worthy of its name, and has been selected by many designers for operating many different machines. There probably is no industry in which you will not find it at work, for it is a positive drive. One authority has said of the silent chain that it is as flexible as a belt, as positive as a gear, and more efficient than either. That is not putting it too strong. This type of chain drive may be had in sizes capable of transmitting 2,000 horsepower.

An interesting use of a silent chain was recently noted, where it was applied to off-bearing duty, acting as a conveyor in carrying blankings from a punch press. The chain presents a surface sufficiently smooth on outside of drive, to allow use as a conveyor.



M101 Set has a range from 3/8" to 2½".

No.	Range	Wt.	Price
M0	3/8" to ½"	3/16	$4.50
M1	½" to 11/16"	3/8	5.75
M2	11/16" to 1"	1	7.75
M3	1" to 1-9/16"	2¾	12.00
M4	1-9/16" to 2½"	9	22.00
M5B	2½" to 3¼"	17¼	44.50
M5C	3¼" to 4"	30¼	44.00
M55	3¼" to 4¾"	42¼	89.00
M6B	4" to 4¾"	38	70.00
M6C	4¾" to 5½"	53	76.00
M5	2½" to 4"	42½	68.50
M6	4" to 5½"	78	100.00

Immediate delivery of these sizes from stock.

Write or wire for bulletin M42-12H

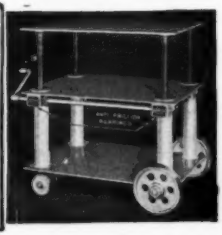
K. O. Lee Company
Aberdeen, South Dakota

GLAMOR IN THE WELDING SHOP

Tired of wearing shapeless protective clothing, cute Jane Morrison (above) has solved the problem of how to weld safely and still look feminine by donning tailored leather garments. First of its kind to be shaped to women's curves, her new safety clothing was designed by American Optical Co., safety engineers to afford protection against flying sparks. Leather gauntlets and cap, welding helmet and safety goggles—not to overlook the lipstick—complete her protective ensemble.

Buy United States War Savings Bonds and Stamps

SAVE MAN-POWER – SPEED WORK



PORTELVATOR

Portable Elevating Table

AN efficient "helper" on jig-borers, planers, millers, drill presses and punch presses. It carries and supports. Capacity up to 20 tons.

Write Dept. B-12 for details.

THE HAMILTON TOOL CO.
Ninth and Hanover Streets.
HAMILTON OHIO

Cleveland Planer equipped with
Westinghouse Variable Voltage Drive

with ROTOTROL and Westinghouse VARIABLE VOLTAGE DRIVES!

Faster cuts—faster return! Westinghouse Variable Voltage Drives speed up nonproductive return strokes, give more cutting strokes per minute. ROTOTROL—versatile Westinghouse control—gives faster acceleration and deceleration, provides closely regulated d-c power, regardless of load, over entire speed range (40 to 1200 planer motor rpm). Table can be stopped and reversed at precise same point every time.

Fewer relays, contactors and electrical operations per stroke reduce need for maintenance and time out, too. Get full details . . . write Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. J-21209

Westinghouse

VARIABLE VOLTAGE DRIVES

Bins

There are 2 ways in which bins can be of particular service in the metal-working industries. One of these is for storage of parts and supplies. The other is for transport. In the case of storage, bins may be of large or small size, depending on nature of the parts stored. With particular reference to convenient storage of small parts, commercial bins are available in different types, arranged for stacking in courses, so that a great variety of small parts may be kept readily available. Of especial interest to assemblers is a semi-circular arrangement of tapered bins, having floors sloping toward the assembler, so as to keep contained parts feeding toward the front, where they may be easily obtained.

Bins of transport type can be made up in various forms by any shop handyman. They may not be made commercially available as yet. We haven't heard of them. You can readily see how easy it is to weld up material to form a transport bin suited for handling with a lift truck of either hand or electric type. Such trucks are used in many shops. It is also possible to make up such bins with the idea of moving them from place to place in wheelbarrow style, or to incorporate into their making a heavy ring at the top, to make them suitable for easy handling by the shop crane.

Cases have been noted where bins were fitted with trolleys for transporting by monorail, and any shop that is equipped with a monorail system may well give this consideration, especially with reference to the handling of scrap, or metal chips and turnings. This is a highly convenient method of handling such material. Bins may be supported on metal bails.

Maximum Tool Life
plus Maximum Production
—Use CROBALT!
● A superior heat resisting chromium-cobalt-tungsten high speed cutting alloy. Permits higher speeds with longer tool life.
Eliminates the possibility of chipping. Combines maximum production with minimum cost per piece.
Catalog rushed on request . . .
Write Dept. E
CROBALT INC.
ANN ARBOR, MICHIGAN
CROBALT

★

"We MUST • We CAN • We WILL!"

President Roosevelt

★

V-Belt Conservation

As its contribution to the war effort and as a service to thousands of power-users, depending upon v-belt drives to keep production machine wheels turning, a beautiful and timely book giving 23 ways to conserve v-belt life has just been issued by the Multiple V-Belt Drive Ass'n. 104 S. Dearborn St., Chicago. In red-white-blue poster form, copious illustrations with concise captions explain in non-technical terms how v-belts may be made to give maximum service and their life prolonged. Sole purpose of the book, says P. W. Upp, executive secretary of the association, of which prominent concerns are members, is to educate power-users in proper procedures of selection, installation and maintenance of multiple v-belt drives, as a definite step in conservation of rubber and reduction of needless waste.

Copies can be had by addressing the Association.

GILBARCO
COOLANT
PUMPS...
DEPENDABLE...
DURABLE

MODEL CE
Immersion Type

● One of a complete line of pumps for all machining operations. ● Built for twenty-four hours a day service. ● Instantaneous coolant delivery, self-priming, never becomes airbound. ● Does not build up pressure at slow speeds. ● Unharmed by abrasives in liquid—or by running dry. ● Built by one of the country's largest pump manufacturers.

Write or wire for literature, prices and deliveries.

GILBERT & BARKER MFG. CO.
WEST SPRINGFIELD, MASS.

Cables & Ropes

Frequent inspection of cables should be arranged to determine wear, lubrication, the condition of connections and the sheaves or drums over which cables wind, possible overloading and effect of chemicals or weather.

Proper use and maintenance of wire cables will greatly prolong their life. It is much safer to provide and use chain or cable that may be over-size for the average load but capable of lifting the heaviest load. This will reduce cable or chain failure from "chance taking" and, in the case of slings, will reduce the lost time in changing from average to heavier sizes.

Sling cable used with traveling crane or hoist should never be piled on sand floors (such as are found in foundries). Sand will be likely to get betweeen the wire strands and act as an abrasive, cutting the wires between strands and also affecting the cable center. The use of metal "A" frames for storing sling cables and chains not only protects them but also facilitates their safe handling and permits better inspection.

It has been a worthwhile practice in many plants to have the craneman or hoist- operators test the upper limit stops of this equipment immediately at the start of their job. Often this prevents shearing off the cable and dropping the load should it be raised beyond the limit and the limit fail to work.

As in the case of cable, whenever possible, steel hooks should also be over-sized, or should be made of nickel-alloy or other strong material with a high safety factor. The carrying of loads on hook-ends should be discouraged. Considerable care should be taken in the annealing and reshaping of hooks when they are bent out of shape so that their strength will not be materially impaired.

LEADING MANUFACTURERS ARE USING GILMORE DIAMOND TOOLS

Each week finds Production Engineers asking for more and more GILMORE DIAMOND TOOLS. Why? Because these tools have been thoroughly tested and are meeting every precision requirement and shop need.

Users of GILMORE DIAMOND TOOLS are satisfied customers. The careful selection of hard diamonds plus a secure setting in nickel-alloy makes for a tool of high quality.

Ample production facilities make quick deliveries possible.

Write today for information.

F. F. GILMORE & CO.

285 Columbus Ave.
Boston, Mass.

2834 E. Grand Blvd.
Detroit, Michigan

Production Vise *with Adjustable Pressure*

Eliminates Distortion Spoilage

The Presto-Vise has a great advantage over ordinary production vises because its jaw pressure can be adjusted according to the type of metal that is being clamped, thus eliminating spoilage losses due to distortion of parts.

It also has a toggle-linkage feature which insures uniform pressure regardless of differences in thickness of the parts being clamped. And it is convertible into a drill jig by the use of various attachments provided with the vise.

Free CATALOG

D. A. SMITH & CO.
8087 Livernois, Detroit, Mich.

PRESTO-VISE

"SCHULTES"
The King of Motor Drives!

Unit Shown on a Gould & Eberhard

ALL HELICAL GEARED, UNSURPASSED IN POWER, EFFICIENCY, SAFETY AND COMPACTNESS

Write for Complete Detailed Specifications

WESTLOF TOOL & DIE COMPANY
4192 BELLEVUE AVE.
DETROIT, MICHIGAN

Hypro Planer Bulletin

New Bulletin No. 152, issued by Cincinnati Planer Co., covers its double housing and open side planers, plano type millers and vertical boring mills, giving general specifications and details. The bulletin is issued for the purpose of showing the line of machine tools manufactured, in general more than in full detail. Latter is left to specific bulletins devoted to individual machines. All bulletins, says the firm, may be had on request. No. 152 is file size and consists of 31 pages with all machines shown in large illustrations, together with general specifications. A brief history of the company, from its start, in 1898, to date is given in latter pages of the book.

OPA Interpretations

A manual containing digests of interpretations relating to services, has just been issued by the OPA. It brings together important interpretive rulings under the General Maximum Price Regulation and Maximum Price Regulation No. 156-Services. Much of the compiled material has been made public from time to time in press releases and other official announcements.

Copies are for distribution to trade associations and information services.

Famco Press Bulletin

The Famco Machine Co., Racine, Wis., manufacturers of Famco Arbor and Foot Presses, announce a "streamlined" presentation of their products in a new 4-page, file size folder. A handy, new Famco Data Sheet (No. 7-B) is presented simultaneously, giving accurate dimensions of over 4 stock models, load capacities, and even floor-space requirements.

Famco Arbor and Foot Presses are being used in production, maintenance and repair work; in mobile field machine shops, in the army and navy, and for hundreds of new industrial applications. They offer the exclusive Famco front and side Gib adjustment for sustained alignment. Another feature of Famco presses is the square ram claimed to apply a more uniform pressure without springing.

More Speed

WITH THE
NEW
CARDINAL
AUTOMATIC *AIR VISE*

WRITE FOR BULLETIN

CARDINAL MACHINE COMPANY
INCORPORATED
GLENDALE, CALIFORNIA
"The SPEED VISE Manufacturer"

WANTED: BOYS OR GIRLS TO SHARPEN SMALL DRILLS IN WAR PRODUCTION PLANT. NO EXPERIENCE NEEDED

BLACK DIAMOND
PRECISION DRILL GRINDERS

The above advertisement could well be yours, because anyone can sharpen small gauge or fractional drills on a Black Diamond Grinder.

Motor driven, these highly efficient machines are doing yeoman service in large and small war production plants throughout the country.

They not only produce quantities of perfectly sharpened drills, with lips of uniform length, correct angle and proper clearance for true, accurate drilling—but release skilled mechanics for more important work.

The Web thinner, an important attachment, cares for the proper grinding of Notched, Colton or so-called Crankshaft points . . . and the diamond dresser keeps the grinding wheel always sharp.

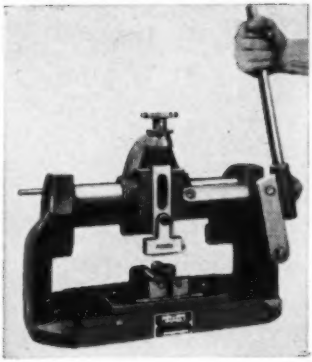
Write for Bulletin 122

BLACK DIAMOND SAW & MACHINE WORKS, INC.
NATICK, MASS.

No. 9A Marking Machine

Purposely designed to eliminate adjustments and other time-consuming motions, these machines are claimed to permit untrained personnel to make perfect markings at all times on shells, shot, tubular and cylindrical parts.

A diversity of accessories is available for neat precision markings with either the hand operated or motor-driven marking machine. For intermittent marking or controlled spacing, a geared mandrel and straight line holder assembly is used.



For marking flat parts, a rotary holder with type or roller die is used. Serial numbering is accomplished with an automatic numbering head; repeat numbering is possible by a single adjustment.

Operation is simple. At pull of the lever, a uniform mark of any desired depth is made; another part is marked on the return stroke. The motorized unit can be operated at a set speed to suit feeding speed of operator.

Construction details include grey iron castings for base and head; shaft and bearing bar of cold drawn steel; head gibs and slide of tool steel, and all bearing surfaces are cast iron against steel. Height: —14⅜"; length, 17¼"; depth, 7¾". Address The Acromark Corp., 15 Morrell St., Elizabeth, N. J.

FOR REMOVING BROKEN TAPS

Quickly—
Insert WALTON Tap Extractor and back out broken piece. No annealing—no drilling.

Easily—
Tap Extractor and Tap Wrench are only tools needed.

Safely—
Threads are not damaged. Not necessary to tap oversize after broken tap is removed.

Folder 131 gives complete details.

The Walton Co. 95 ALLYN STREET, HARTFORD, CONN.

CUB
VARIABLE SPEED TRANSMISSION

For "A" section V-belts—3.3—1 speed range—perfect belt alignment in all positions. Priced so low that no shop or machine need go without infinite speed selection. *See your dealer or write* $16.50
(3 Types—8 sizes to choose from)

Standard Transmission Equipment Co.
3409 VERDUGO ROAD LOS ANGELES, CALIF.

PROMPT DELIVERY
PRECISION GROUND THREAD PLUG GAUGES

- Single End Plugs
- Double End Plugs
- Combination thread plug and plain plug for minor diameters

ANY SIZE TO ORDER
MARYLAND MACHINE COMPANY
5213 Reistertown Rd., Baltimore, Md.

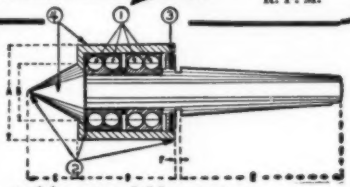
QUADRO *PRECISION* LIVE CENTERS

5 REASONS *Why They Meet Every Specification:*

1. FOUR (4) ROWS of precision BEC-4 specification bearings.
2. Note SHORT OVERHANG assuring rigidity and accuracy—eliminates "chatter"
3. Positive FELT-SEAL—excludes dirt—retains lubrication.
4. HARDENED AND GROUND CONE—point accurate to within .0002.

5. HEAVY DUTY—Note Combined Radial Thrust Load at 100 R. P. M.

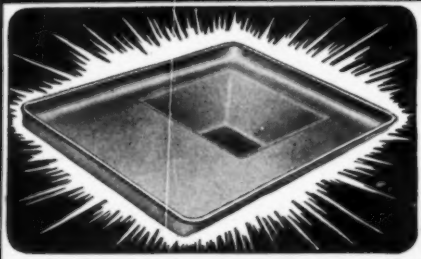
Morse Taper No.	A	B	C	D	E	Combined Radial-Thrust Load At 100 R.P.M.	Net Price
2	1⅝	⅛	⅝	1 11/16	2¾	1600	$23.00
3	1⅝	⅛	⅝	1 11/16	3⅞	3300	$25.00
4	2 1/16	1/16	31/32	1 15/16	4⅝	7500	$35.00
5	2 5/16	1 3/16	1	2 5/16	5⅞	12000	$47.00



All orders must be accompanied by extendable priority

FISHER TOOL CO. 226 LAFAYETTE STREET NEW YORK CITY

LATHE PANS



LITTLEFORD

LITTLEFORD BROS.
435 E. Pearl St.
Cincinnati, Ohio

Speed up your production by using precision made Lathe Pans delivered to your plant ready to install. Why tie up parts of your plant when you can secure low cost Pans made in a plant set up for this work. Any size or shape can be made with accuracy.

Send your blueprints for prices, today!

Stop 'em!
with NORGREN FILTERS
Stop grit, pipe scale, moisture and emulsified oil from wrecking havoc with your air tools, air cylinders and other air-actuated mechanisms.
The double-thick, Monel Metal screen is easily removed for cleaning. Solutions and foreign matter are deposited at bottom of filter and blown out simply by opening waste cock.
NORGREN Filters
"Positive Protection"
SIZES & STYLES for Every Air Line Need
C. A. NORGREN CO.
DENVER, COLORADO

Brackets

Various types of brackets have solved difficult problems in design of machines and mechanisms. Early designs of conveyor belt carriers presented a type of bracket that was interesting, there being 2 brackets, each supporting two socket-type shaft mountings, for each carrier. The arrangement was such that 1 horizontal shaft could be supported between the 2 brackets, and two stud shafts could be supported at an angle at the outer ends, for cupping the belt by means of short rollers mounted on the stud shafts. Belt carrier design has seen considerable improvement since such brackets were in such extensive use, but this type of bracket still holds the same lesson in design for us:—that by means of a single bracket, 2 or more shafts may be held in any desired fixed relations; and that those shafts may be used to mount rolling elements.

Chain-type trolley conveyors of continuous type, sometimes offer interesting studies in bracket design. In one trolley layout noticed, chain used is of a special type, alternating links being so devised as to allow lower ends of the trolley wheel brackets to pass right thru the chain links. Chain attachment lugs are then applied to the brackets, so that they cannot retreat thru the chain links, and the arrangement is such that the bracket tongue is left extending down below chain link. The hooks or other devices designed to carry the load may then be attached to these extended tongues, so that the weight is directly carried by the conveyor trolleys.

Brackets may be welded in place, bolted, hinged or trunnioned. They may be stationary or swinging. They may be designed to hold a shaft or spindle, and be fitted with an eccentric bushing to vary center-distances.

UP
PRODUCTION WITH A KALAMAZOO

Make your rough cuts within thousandths of an inch! Save precious machine time, save valuable steel. A Kalamazoo Metal-Cutting Band Saw gives you this kind of accuracy to boost production! Sturdy design, ball-bearing construction, hydraulic controls, Completely portable—saves set-up time. Cuts all shapes!

Write for specifications.

IMMEDIATE DELIVERIES

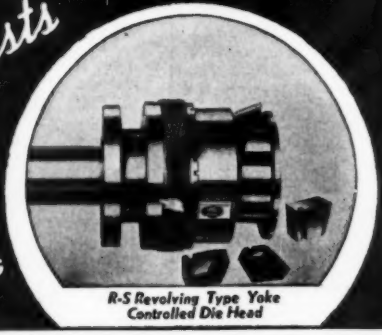
NOW AVAILABLE!

MACHINE TOOL DIVISION
KALAMAZOO TANK & SILO COMPANY

508 HARRISON ST.
KALAMAZOO, MICH.

RICKERT-SHAFER
Specialists

IN THREADING TOOLS



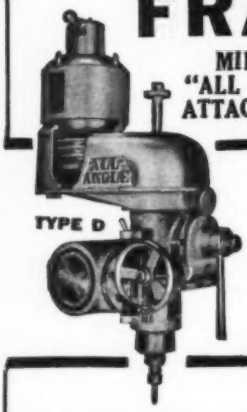
R-S Revolving Type Yoke Controlled Die Head

- AUTOMATIC DIE HEADS
- COLLAPSIBLE TAPS
- BORING HEADS
- FRICTION TAPPERS
- SPECIAL THREADING MACHINES

The RICKERT-SHAFER Co.
ERIE, PA.

FRAY

MILLING "ALL ANGLE" ATTACHMENTS



TYPE D

★ *Write for Catalog MA* ★

FRAY MACHINE TOOL CO.

501 W. Windsor, Glendale, Calif.

Non-Deforming Steel

In a booklet, Truform, Jessop Steel Co., Washington, Pa., gives details of its oil-hardening, non-deforming steel, Truform. Four main features are attributed to the alloy: Non-shrinkable, greater hardness, toughness and high machinability. Jessop recommends it for applications needing great accuracy, as having low coefficient of expansion under heat treating and hardening. Deep-heating qualities, it says, and fine grain structure adapt it to large production of a single grind, permitting greater number of grinds before the tool is worn out. Processes affording close control of grain-size in manufacture, are said to afford unusual toughness with lessened susceptibility to breakage. Special spheroidizing anneal after hammering or rolling is claimed to lend easier machining, contributing toward reduced tool and die costs.

The booklet, giving applications, analysis, forms available and full working data, is purposed to acquaint those interested with properties of the Jessop product. It is available on request.

Standard Since 1911

L&J

INCLINABLE POWER PRESSES

NO. 5 BACK GEARED TYPE

Capacity, 3 to 40 Tons

Write for Literature

L & J PRESS CORP.

successors to Lushbaugh-Jordan Tool & Machine Co.

1621 STERLING AVE. ELKHART, INDIANA

Geared For Victory

Gear Specialists

- SPUR
- WORM
- BEVEL
- HELICAL

The Taylor Machine Co.

1917 EAST 61st ST., CLEVELAND, OHIO

"TAYLOR-MADE"

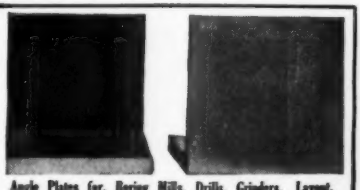
TWENTY-FIVE YEARS AGO—Rolling back the years, here is a shop view in the first plant of Michigan Tool Co., in Detroit, shortly after its organization in 1915. At extreme left is Carl J. Halborg, now President, Colonial Broach Co. At extreme right is Thor Olson, now Vice President, Ex-Cello-O Corp. Next to Olson is Otto Lundell, late President, Michigan Tool Co. At rear, right is Robert Anderson, one of the founders and late executive of the Company. Since that time, Michigan Tool has expanded 4 times. It is at present building another new plant on Six Mile Road.

Westlof Drive Unit

Adapted to flat-belt, V-belt, chain or direct drive, Schultes 4-speed Safety Drive is detailed in a pamphlet newly issued by Westlof Tool & Die Co., 4192 Bellevue Av., Detroit.

The unit, it is stated, may be adapted to any machine requiring change of More can be accomplished with highly specialized tooling in a machine tool of an earlier model, than thru the use of a most efficient and modern machine with inadequate tooling, something that could be likened to hitching a race horse to a plow.

When a design or an idea is born, we should first look to the tool engineer to offer his final analysis of whether or not the product can successfully be made. In plants where this practice has been adopted, the tool engineer has opportunity to analyze the product from a production viewpoint, and without any selfish motive whatever can be instrumental in showing how certain changes and modifications can be made to eliminate expenses and costs which might otherwise be overlooked.



Angle Plates for, Boring Mills, Drills, Grinders, Layout, Inspectors, Surface and Lapping Plates, Prompt Delivery.

TATRA TOOL CO.

16317 Sanford Ave. - Cleveland, O.

Removes burrs from inside and outside edges as fast as parts can be handled!

USED ON *any machine*, the smooth, clean, cutting action of the NOBUR will pass the most critical inspection. NOBUR is a time-saving, mistake-saving shop tool that eliminates slow, costly hand methods of burring. It lowers production costs and increases production by hastening approval of finished parts. Easy to operate ...no skilled help is necessary...green 'trainees' or women operators can do burring with speed and accuracy...NOBUR minimizes costly reworking and enables the operator to do more in less time ...NOBUR is simple in construction...rugged...important parts are hardened and ground...shaft is finished to a diameter slightly under its basic size...double-edged cutting blade is of special tool steel, cuts freely in either alloy steels or soft metals. Order through your distributor NOW...or write for literature direct to the

NOBUR MANUFACTURING CO.
910 No. Orange Drive • Hollywood, Calif.

NO/BUR TOOLS

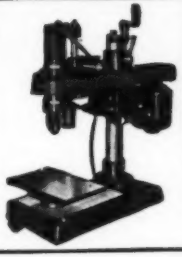
screw machine.

A case in point was noted where a motor car manufacturer was producing engine support bolts nearly 8" long on a 5-spindle automatic, and threading the bolts right in the same machine. These machines are often quite capable of doing a job we do not ordinarily consider them adapted for, and it is an interesting fact that builders of these machines are ready to turn the efforts of their engineering departments toward the solution of setups for special problems. The bolts mentioned above had a relatively small head, not requiring steel of a much greater o.d. than was required for the body of the bolt, so that turning them directly did not mean a great loss of steel, or any large amount of metal to be removed.

Bolts

While there are many types of standard bolts that can be purchased from bolt manufacturers at lower cost than they can be made in the individual shop, there are always special bolts needed for the assembly of different types of metal products. Probably the best answer to the special bolt problem, where they are used in a considerable quantity, is the employment of a highly competent multiple-spindle automatic

Where bolts are made in large quantities, it is in order to use steel of the approximate size to produce the bolt body, and if the head is to be considerably larger, an upsetting operation is required to form the head. So great has been the improvement in tool steels in recent years that in many cases bolts are cold-headed, the metal being upset while cold.



The HAMILTON MUEHLMATT Super Sensitive DRILLING MACHINE

Out-Performs 'Em All

Precisely positioned and drilled tiny holes from .004 to 5/16" dia. An indispensable aid to production. Use it and

SAVE ON SMALL DRILLS

Write Dept. B-12 for details.

THE HAMILTON TOOL CO.
Ninth and Hanover Streets.
HAMILTON OHIO

Dumore Issues Grinder Catalog

Designed to facilitate the rapid and efficient purchase of portable precision grinders, The Dumore Co., Racine, Wis., has just published a 36-page catalog.

More than 15 tools are listed and carefully segregated to insure selection of correct accessories with each tool. Each grinder is illustrated and principal dimensions are given in outline drawings.

Grinding quills are illustrated with each grinder and the range of work that can be handled is specified. In addition, a cross-sectional drawing explains the internal construction of the grinders and a wide variety of application pictures indicates the range and scope of work that can be handled with Dumore Grinders. The catalog is designated as No. 42.

Fatigue Vs Efficiency

In industry, in business, the home, in schools, we are all, adults and children alike, subject to fatigue, when work is monotonous or demands a high degree of concentration. Such fatigue, according to a pamphlet, "Fatigue Vs Efficiency", offered by American Bottlers of Carbonated Beverages, 1128 E. 16th St., Washington, is not entirely relieved by a full night's sleep. Resulting from pressure and monotony of work, it has been shown to up the curve of accidents and inefficiency, according to the booklet. The condition, say the Bottlers, can be relieved by proper preventive steps. Sufficient rest, proper diet, posture, etc., are factors affording relief. They do not, however, remove the possibilities of fatigue. Reasonable rest periods, preferably with nourishment of some kind, are shown to be materially helpful.

The pamphlet goes into causes and effects of fatigue, and points out measures for combatting the condition in industry as well as the home, with informative text, illustrations and graphs. There is no charge for copies on the part of executives interested.

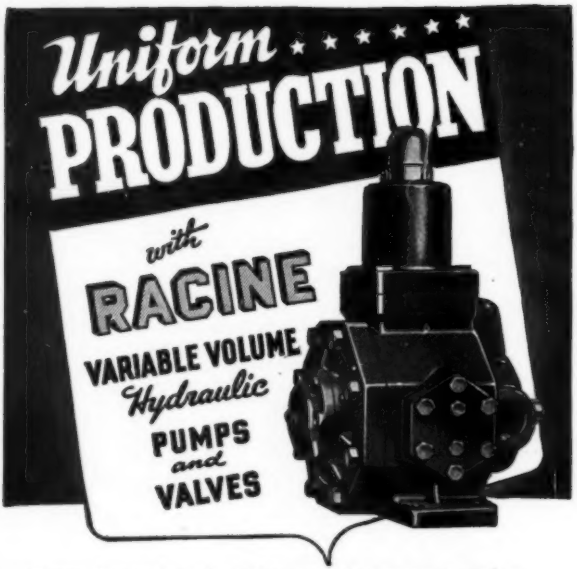
5000 SHAPES AND SIZES GROBET Swiss Files

Ask for Catalog WF.

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss Files. Ask also for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

GROBET FILE CO. OF AMERICA 421 Canal St., New York, N. Y.



Correct time cycle and positive accurate pressure control are important in modern production. RACINE Variable Volume pumps automatically pump only the amount of oil needed to open and close platens and to maintain exact pressures for forming, moulding and pressing.

There is no by passing of oil, no oil heating, or wasted horsepower, there are no extra volume controls required such as relief and check valves. Investigate RACINE Hydraulic equipment—a full line of Variable Volume Pumps and Hydraulic Controls for oil hydraulic installations. Write for catalog P-10-C today.

"STANDARD THE WORLD OVER"

RACINE TOOL & MACHINE CO.

1754 STATE STREET • RACINE, WISCONSIN

Goggles

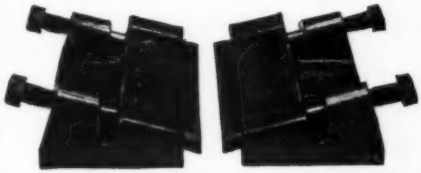
In a recent issue of National Safety News, H. T. Dean, Industrial Relations Mgr., International Harvester Co. of Canada, Ltd., Hamilton, Ont., tells what has been accomplished by the use of goggles in saving eyes and reducing compensation costs.

Where eyes are concerned, he says, there are no non-hazardous occupations in Harvester plants. After describing the measures taken to make the wearing of goggles continuous and universal, including provision of prescription goggles, he says:

"When we asked our shop employees to go 100 per cent to goggles we agreed that this policy would include everyone entering the shop, whether office employee, visitor, or whoever it might be, and we have endeavored to live religiously to that policy. Authority was given to every shop employee to stop anyone, no matter who it might be, from our highest executive officer down, who might enter the shop without safety goggles, and request him to obtain a pair before proceeding.

"When large groups of visitors are conducted thru our plant they are all supplied with goggles before being permitted to enter. While our eye protection policy originated thru voluntary effort on the part of the employees, the wearing of safety goggles is now accepted as part of our regular employment policy and we meet with very little objection in this respect."

HART'S Divided Machine Vises



These Vises will hold work the full length of the table, if necessary. Useful on planer, milling machine, surface grinder or drill. They adapt themselves to any shape and can be used on sides of table as well as ends. The jaws are tool steel and hardened, the angle holding the work down on the table.

HART'S Milling Fixtures

These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes—¾" to 4".

HART MACHINE CO.
26 MATHER ST., DORCHESTER, BOSTON, MASS.

When writing for descriptive circular kindly mention the BLUE BOOK.

WILLEY'S TORPEDO TYPE WHEEL DRESSERS

Many scientifically spaced layers of natural diamonds, securely anchored in a proven matrix that holds each stone securely, until the last stone is used. Willey's Torpedo Type Dressers are unequalled in performance and low-cost dressing. Available in four sizes, to meet your wheel dressing requirements.

No.	Usable Contents of the Diamonds		QUANTITY PRICES				Wheel Diameter
	Diameter	Length	1-25	26-50	51-75	76-100	
W-3	1/8	1/8	$11.00	$10.00	$ 9.00	$ 8.00	6 to 12
W-4	1/4	3/16	13.00	12.00	11.00	10.00	12 to 20
W-5	3/16	1/4	15.00	14.00	13.00	12.00	20 to 24
W-6	1/4	1/4	17.00	16.00	15.00	14.00	24 to 42

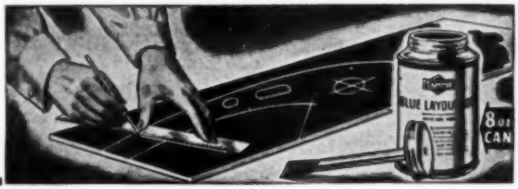
WILLEY'S CARBIDE TOOL CO.
1340 W. Vernor Highway, Detroit, Michigan

Machinists—Tool & Die Makers—Sheet Metal Men—Pattern Makers—Get...

FREE SAMPLE TAMMS BLUE LAYOUT DOPE

Speeds layout time on brass, aluminum, copper, tin, stainless steel. Won't chip, crack, or flake off. Comes in handy 8 oz. bench type brush-in cans. Also pts., qts., gals., drums. *Send for sample now!*

Tamms Silica Co.
228 N. LaSalle St., Chicago, Ill.



Gives Coldwelding Data

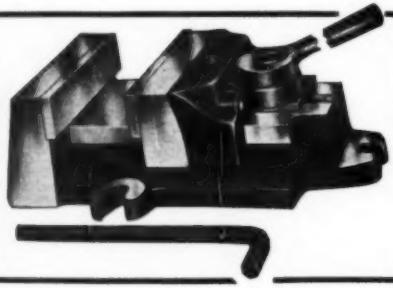
In 3 minutes time, says a folder by Eutectic Welding Alloys, Inc., 20 Worth St., New York, you can learn about low temperature welding and how it fits in with some problems you're bound to encounter. Problems may be found among prefabricated parts, tools, assemblies, etc.; reclamation of machine components and tools; salvaging new, but defective castings. The folder, prepared for no-charge distribution to interested executives, shows how aircraft, engine, tool and machinery manufacturers and shipyards employ low temperature welding on such jobs to advantages not common to fusion welding. According to illustrations in the folder, showing handy applications of the technique in welding cast iron, steel, nickel, monel, aluminum, bronze, copper, brass, magnesium, etc., the folder should be a welcome addition to the library of any maintenance, production or engineering department.

Micromax Thermocouple Pyrometers

At a time when a great many people are asking questions about dependable pyrometers for war-industry use, Leeds & Northrup, 4934 Stenton Ave., Philadelphia, have just reissued —in strictly up-to-date form—their catalog N-33A on Micromax Thermocouple Pyrometers.

In 56 well-illustrated pages, this book tries to cut correspondence and to give war-time pyrometer users first hand the information they want about available instruments—indicators, recorders and controllers—and about the thermocouples and accessories which are used with them.

New or prospective users of balance-type (potentiometer) pyrometers should be interested in the concise but comprehensive description this book contains.



PLUNKET QUICK ACTION VISE
for DRILL PRESS OR MILLING MACHINE

Designed for production work, using an eccentric motion to apply pressure to jaws. Eccentric motion moves jaw 5/16".

Size	Net Price
6" jaws, 1½" deep, opens 4"	$38.50

Pressure between jaws, with handle furnished, 2200 lbs. Net weight 36 lbs.

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers, Grinders

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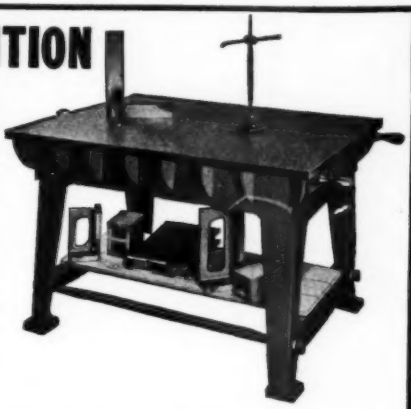
J. E. Plunket Machine Co., 1823 W. Lake St., CHICAGO, ILL.

A USEFUL ADDITION



Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. *Write today for full information.*

J. C. BUSCH COMPANY ENGINEERS AND MACHINISTS SINCE 1907
165 SO. BARCLAY ST., MILWAUKEE, WIS.

INCREASE PRODUCTION — SAVE TIME AND TOOLS

use **GRAY-MILLS METAL-CUTTING**

"Flo-Bac" COOLANTS

Highest quality. 4 types cover most all requirements.

Immediately available. From your distributor's stock or our plant.

Convenient quantities. 3 gal. to 55 gal. — wood or metal containers.

Ask your Distributor or write direct

GRAY-MILLS

COMPLETE PORTABLE COOLANT SYSTEMS
FLO-BAC COOLANTS, PANS AND FITTINGS
GRAY-MILLS CO., 215 W. Ontario St., Chicago, Ill.

IMMEDIATE DELIVERY

ON THE NEW ATLAS DIE-FILING MACHINES

Can be used for all kinds of die making. The overarm is constructed so that the file and saw attachments may be interchanged with little effort. The holddown fingers are attached directly to the overarm. Working surface of the table, which tilts two directions, is entirely clear. An improved type chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast.

Price, complete with motor— $125.00 Net

F. O. B. CHICAGO

ATLAS EQUIPMENT CO.

103 So Clinton St., Chicago, Ill.

PYRO THE SIMPLIFIED OPTICAL PYROMETER

Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO.
102-105 Lafayette St., New York, N. Y.

Zinc Plated Steel Sheets

A new metal has been added to the line of plated metals produced by the American Nickeloid Co., Peru, Ill. This time it is a war-minded metal—electro-plated zinc on steel—which is offered as a satisfactory substitute for pure nickel, tin, chromum, aluminum, or stainless.

In addition to conservation of more critical metals, the new electro zinc plated steel is said to be more economical in price than any other American electro-plated metal produced heretofore.

The zinc provides a protective coating to the steel base metal, making the sheet highly resistant to corrosion and rust. In fact, a galvanic action is claimed to take place between zinc coating and base metal which imparts additional corrosion-resistance to the steel. Zinc and steel bond well, forming a coating that is easily workable in manufacture. Zinc plated Steel can be bent, stamped, formed, drawn, soldered, and spot welded to meet most production requirements.

Electro zinc plated steel is supplied in uniformly pre-finished flat sheets, eliminating the slow and costly plating of small parts after fabrication. Coating is guaranteed against cracking or flaking.

The new product is furnished at present in sheets only, in sizes up to 36x96", in a full range of gauges and tempers, in polished, unpolished, and satin finishes. Thickness of coating can be varied to meet requirements and specifications.

GREATER PRODUCTION! BETTER WORK! ON THE *LINLEY NOISELESS RIVETERS*

Sturdy, fast, easily operated! Put your production rivet spinning jobs on Linley Riveting machines and watch your costs come down.

We are glad to demonstrate the quality of work that can be turned out. Send us samples of your parts and you'll be impressed with what you can do and how little it will cost you. Sizes and types available for iron or cold rolled steel rivets up to 3/8" with capacity for larger rivets of softer materials.

Write for descriptive bulletins.

LINLEY BROS. CO. 663 STATE ST. EXT. BRIDGEPORT, CONN.

GRAHAM MULTI-PURPOSE VISE

Acts as jig or fixture for many kinds of work

On drill press, radial, planer, shaper, miller, grinder, this rugged, four-square vise will hold an endless variety of repeat-operation work, when equipped with jig fixtures, V-jaws, shell jaws, etc. Saves countless tool-making hours. Perfect as a plain vise.

ASK ABOUT OUR KNURL HOLDER FITTING LATHE TURRET

Request Illustrated Price Circulars

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★ DYER ★

Heavy Duty Spot Welders

Floor models 10 to 35 KVA.

6 point selective switch on all floor models allows for quality welds on various materials. Standard and Underwriters Labeled Machines.

3 point switch on bench models.

Bench models 2½ to 10 KVA—with or without pedestal.

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Few Territories Available.

Dyer Welders are available in a wide range of sizes and capacities—air, motor or foot operated, giving maximum production — simplicity of operation—power economy.

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FOR GREATER PROTECTION
GS TWO-LOCK TOOL CHESTS

The right type of chest for every mechanic from higher grade to more reasonably priced.

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122 Lafayette St.
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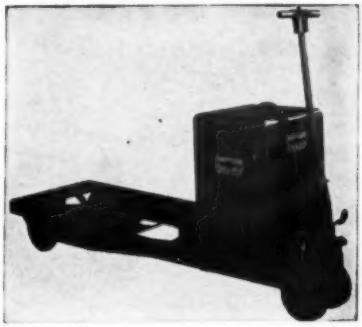
SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table swivels and locks in any position. Can be varied 15½° by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO.
112 Webster St., Dayton, Ohio

PowerOx



Newest addition to its well-known, established line of lift trucks, PowerOx, just announced by Barrett-Cravens Co., 3262 W. 30th St., Chicago, marks entrance of the firm into the field of power-driven lift trucks. In it, Barrett engineers have combined the company's standard NT multiple stroke lift trucks with electric power drive, which propels loads from place to place, as wanted.

Exclusive features are claimed for the apparatus, all of them detailed at length in the brochure available from the manufacturer. Capacity of the truck is 4000 lbs, and it is available in 19 and 25" widths. Platform lengths are 48 and 60". Lowered heights, 7, 9 and 11".

An important advantage is claimed in the rear drive, said to carry 2/3 of the load upon rear wheels, affording improved traction.

Why Not Buy The Original Electric Etcher

MARK IRON AND STEEL

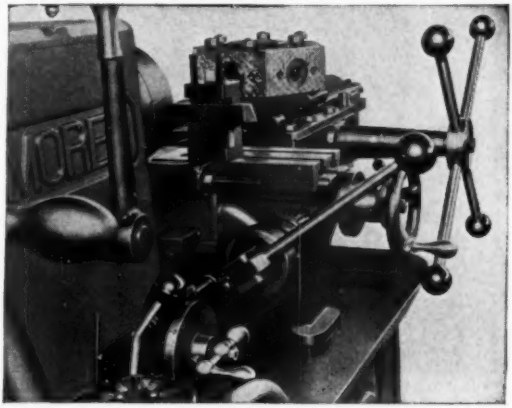
THE ETCHOGRAPH WAY

New ELKONITE TIP pencil.
New Baby Grand Model at a lower price.

2,000 in use

BREWSTER - SQUIRES CO.
42 Church St., New York, N. Y.

Turret Lathe Combination Screw and Lever Cross Slide



A recent engineering development is announced by Morey Machinery Co., 410 Broome St., New York, N. Y. It is applied to their No. 2G Turret Lathe and is an improved quick acting combination screw and lever cross slide.

This enables the operator immediately to use either type of feed, or the screw feed in combination with the lever feed.

This new development allows the operator, by one movement, to select instantly, either the lever movement to the cross slide, or the screw movement, as his work requires. No set-screws for tightening or loosening are employed. A single and effective quick acting clutch does the work.

VERTICAL MILL and JIG BORER

A simplified, precision tool for milling, boring, facing and routing small parts for instruments and arms, munitions, etc.

Spindle dia. at driving end, ⅜", 1150 and 1750 r.p.m., 5 Speeds. 12" longitudinal travel of table, 7" cross travel, 4" Spindle feed.

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A G & S Representative in all principal cities.

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MANCHESTER INC. NEW HAMPSHIRE
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Industry knows Productimeters! Years of research and engineering are behind their speed and precision construction . . . their dependability for accurate production control. Productimeters are prepared now to answer the call on our first line of defense . . . the production machines of America.

Write today for Catalog!

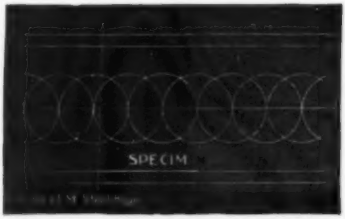
DURANT MANUFACTURING CO.
1928 N. Buffum Street, Milwaukee, Wis. — 180 Eddy Street, Providence, R. I.

WOMAN TEACHES MAN—Thousands of women are being taught war work by skilled men mechanics, but here the situation is reversed—a woman is instructing a man in the operation of a milling machine in war production under way in one of General Electric's New England plants. Sarah Trotsky, veteran of 30 years' factory experience in running lathes, drills and other complex machines, is shown breaking in Franklin R. Maddison, 18-year-old high school graduate, so he can operate her machine on the second shift. She also instructed a man operator for the third shift.

Hollow Mills Folder

Rounding out 34 years of specializing in adjustable hollow mills, folders just issued by Genesee Mfg. Co., Rochester, N. Y., feature, among others, Styles A and B, general-purpose mills designed for average cuts. They are adjustable to .001", in a matter of moments, says the firm, and are made to get maximum output from machines. The mills can be fitted with drills, reamers, have formed blades, etc. Blades may be ground to any angle to point work and turn short tapers. Style B has blades set at 12° rake angle for work on steel and other material demanding a rake angle. A special mill featured by the firm is designed to turn short taper and face end of parts, piloting in a bushing in the fixture.

The company began making its products in 1908, was an important supplier in World War I, and maintains an expert staff available for services and collaboration on application of its mills to present-day production problems.



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STOPS LOSSES
making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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ARTUS ARBOR SPACERS U. S. PAT.

Artus Spacers

Made of Plastic in thicknesses from .001"—.030". Each thickness can be identified by its color.

IMMEDIATE DELIVERY

Send for detailed circular and price list.

Industrial Products Suppliers
2 Broadway, New York City

Technology

Failure to mobilize technology in France, and stripping industries of technical workers by an inadequate draft program, were important factors in the military collapse of that country, Michael J. Deutch, Consulting Engineer, warned the Senate Military Affairs Sub-Committee on Technological Mobilization, lately.

Closing 2 days of public and private hearings on a bill which would establish an independent "Office of Technological Mobilization", Deutch was among a group of witnesses including Waldemar Kaempffert, Science Editor of the New York Times, and Robert C. Brown, Jr., of the Technical Section, WPB, who emphasized need for an overall agency to coordinate technology in the war effort. Deutch, who has had considerable engineering experience abroad, compared the technological mobilization of Germany, France and other European countries. Other witnesses pointed out that important technological fields were not being covered in the American war effort and much talent remained unused.

Kaempffert expressed the view that the day of the garret inventor was over, and that present problems are too complex for the lone researcher. Brown pointed out that organized research was the only method of bringing into the war effort the talents of scattered individual technical workers as well as the facilities of research laboratories.

Kaempffert joined with Brown in pointing out the inadequacies of the present machinery, and contrasted the haphazard participation of America's scientists in the war with mobilization of scientists in the Russian war effort. Kaempffert said that only recently had we started coordinating our scientists.

MODEL 600
DRI-N-WET
Floor Model
In Vertical
Position
Hammond
OF KALAMAZOO
ABRASIVE BELT
SURFACERS
4" and 6" Surface Coated Abrasive Belts
Models 400 and 600 DRI-N-WET
Faster...
MORE ECONOMICAL
Universal in scope of materials handled. Operates in horizontal or vertical position. Work can be done free hand, saving fixture expense and set-up time.
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ALSO: Carbide Grinders; Cylindrical Finishing Machines; Polishing Lathes and Rotary Automatics
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KALAMAZOO • MICHIGAN
EASTERN BRANCH 71 W. 23rd STREET, NEW YORK CITY

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Steel Racks

Save time, steps and money by keeping bar stock, shafting and pipe out of the way and off the floor.

Write for full details.

The Western Tool & Mfg. Co.
Springfield, Ohio

"ALNOR"
PYROMETERS

for every requirement.

Inexpensive, accurate, durable.

Write for catalog.

Illinois Testing Laboratories, Inc.
150 W. Hubbard St., Chicago

BURKE
MILLING MACHINES
Make Fast Work of Small Jobs

Motor Driven

Timken roller or ball bearings to spindle

Write today for circulars.

Burke Machine Tool Co.
297 E. 16th St., Conneaut, Ohio

Bends Armor Plate

A 3000 ton Hydraulic Press, designed for use in bending armor plate, is announced by Lake Erie Engineering Corp., Buffalo, N. Y. Relatively large pieces can be handled on its 168x53" bed.

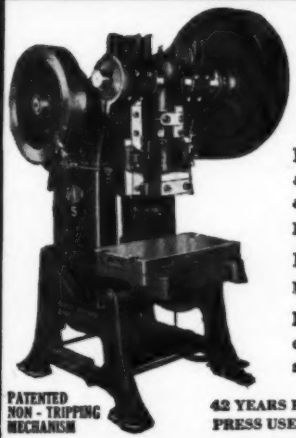
Daylight measures 42" and stroke 42". Ram speeds range up to maximum of 200" pm approach and 12" pm, pressing at 3000 tons.

Entire unit is self-contained with 150 hp pump located on top.

Extremely sensitive pressure control is provided by hand lever mounted at right side of press. Large diameter clear-reading pressure gauge is mounted on control ganel.

Pressure is applied equally across upper platen by 4 large-diameter rams. Platen is guided by unusually long hand scraped guides, bearing on accurately machined columns.

This is the largest addition to the line of Lake Erie hydraulic straightening and bending presses in various sizes and capacities, and is widely used in ordnance and shipyard work.



PATENTED NON-TRIPPING MECHANISM

UNLIMITED PEAK PRODUCTION

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

If you want the best, send or illustrated catalog describing complete line TODAY.

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42 YEARS ENGINEERING EXPERIENCE BUILT INTO EVERY JOHNSON PRESS USED BY LEADING MFR'S. THROUGHOUT THE WORLD.

JOHNSON MACHINE AND PRESS CORP., ELKHART, INDIANA

Lyon Steel Carrier Frames

Lyon Steel Carrier Frames built up with wood liners (inserts) are said to solve the problem of storing and protecting finely machined and highly finished vital war parts and tools using a minimum of critical materials.

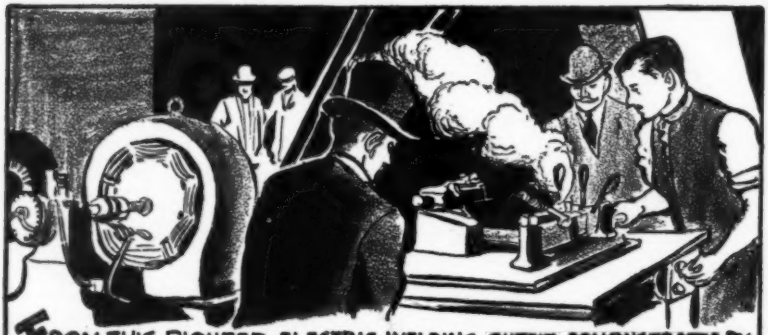
The frame is a rectangular container without bottom, but with side walls formed into a channel shape to strengthen and hold wood inserts in position. The frames are sturdily constructed, adequately welded and precision made. The frames are fitted at each corner with a heavy steel lug to permit stacking. Each lug is attached to the frame with 8 projection welds. These lugs permit several frames to be fastened or stacked together to form one rigid unit.

Frames are made in two sizes:—30x20x5¾" and 30x30x3¾". Three types of wood inserts may be used:—(1) Carriers with partitions, (2) Carriers with holes, and (3) Carriers with pegs. When partition type inserts are used, 679 space sizes are possible. With countless arrangements of the holed and pegged boards . . . plus interchangeability . . . these Carriers can be adapted to practically any requirement. Lyon furnishes only the Carrier Frames. The wood inserts are made by the user to meet his own requirements.

For further information write Lyon Metal Products, Inc., 3042 Clark St., Aurora, Ill.

Get In The Scrap

Mechanics Through the Ages



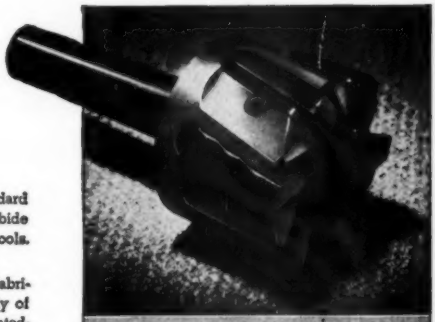
FROM THIS PIONEER ELECTRIC WELDING OUTFIT DEMONSTRATED BY ELIHU THOMSON TO GAPING CROWDS AT THE INSTITUTE FAIR, NEW YORK, OF 1887, STEMMED MODERN AMERICAN ELECTRIC WELDING EQUIPMENT.

AS EARLY AS 1808, **SIMEON NORTH** PIONEER AMERICAN PISTOL-MAKER TO THE U.S. ARMY, EMPLOYED STANDARDIZED MANUFACTURING! IT HAS BEEN SUBSTANTIATED THAT HE ACTUALLY SAVED ONE FOURTH ON LABOR BY CONFINING EACH WORKMAN TO MAKING ONE PARTICULAR PISTOL PART UNTIL HE'D FINISHED 2000!

INDICATIVE OF THE CRUDE TOOLS USED BY JAP WORKERS IN THE EARLY 1900'S, WAS THIS AWKWARD NATIVE 2-MAN DRILL. WHILE ONE LABORIOUSLY CRANKED, THE OTHER DRILLED.

You Furnish the Specifications

CARBIDE FABRICATORS WILL SUPPLY ACCURATE, WEAR-RESISTANT CUTTING TOOLS



IN ADDITION to complete lines of standard cemented-carbide tipped tools, Carbide Fabricators produces a wide variety of special tools. The inserted blade reamer illustrated is typical.

In many cases, tools manufactured by Carbide Fabricators have replaced similar tools made entirely of steel. Particularly in high production, these cemented-carbide tipped cutters have provided more than fifty times the wear-resistance of tools previously used—reducing replacement needs proportionately. They have made possible greater and more lasting accuracy, resulting in a minimum of rejects in final inspection.

As in the case of the tool shown at the right, many armament manufacturers are *starting* new jobs with Carbide Fabricators tools. Vital parts go into production with full assurance that they will be turned out with speed and precision.

Special cemented-carbide tipped tools can undoubtedly do a better job in many of your present and future production cutting operations. Carbide Fabricators can provide you with full details and prices on the tools which will meet your requirements. SO THAT WE MAY GIVE YOU FULL INFORMATION WITHOUT DELAY AND UNNECESSARY CORRESPONDENCE, IT IS VERY IMPORTANT THAT YOUR BLUEPRINTS ACCOMPANY EACH INQUIRY.

INSERTED BLADE CEMENTED-CARBIDE TIPPED REAMER

TOOL ILLUSTRATED — Inserted blade cemented-carbide tipped reamer for aircraft manufacture.

DIAMETER — 3⅛".

OPERATION — Boring aluminum casting to depth of approximately 1⅝", and facing bottom.

SPEED — Approximately 500 surface feet per minute.

FEED — .025" per revolution.

Carbide Fabricators Co. ROYAL OAK, MICHIGAN

MFRS. OF STANDARD AND SPECIAL CEMENTED CARBIDE TIPPED TOOLS

Will do 67%
of all Straight Dressing Jobs

67% of all straight wheel dressing jobs can be done efficiently with an American "A-20" Cluster Tool. Made of 20 carefully selected diamonds, arranged in four layers of five stones each, set in a special, low temperature matrix, with each stone so spaced that there will always be several sharp cutting points in contact with the wheel during dressing operations. Stones are all permanently mounted, no re-setting required.

Compare our price with what you have been paying for "Cluster Tools" . . . we promise performance beyond your expectations. Improved production facilities, new methods of setting and volume sales permit us to price the American "A-20" at $15.00 F.O.B. Detroit. Price includes any standard type mounting . . . specify your choice when ordering. Price subject to change without notice.

American
DIAMOND TOOL & GAUGE CO.
15920 WOODINGHAM • DETROIT, MICH.

depends on the size of the boxes being handled, as well as the weight of material from which they are made. Box-type structures are sometimes of sufficient size to take the form of a rectangular tank or relatively large case. In instances, where they are made in quantity, there are special machines which will bend plate into box form. They are often referred to as universal-brake, rounding and box-forming machines, and will bend and produce a number of other shapes. In fact, they are exceedingly versatile.

Some lighter forms of sheet metal boxes have been assembled by a riveting process. Press tools can be developed for riveting boxes in a horn press, where a great deal greater speed may be realized than in riveting by hand. However, it is undoubtedly better in the great majority of cases to use a spot welder for this type of duty. Some spot welders have remarkable production showing. One machine, for which 100,000 spot welds per day was claimed, played an important part in the production, some years ago, of practice bombs for the U. S. Naval Air Force. Spot welders handle heavier work than is generally supposed. It depends upon model used. Models which will readily catch box work are available.

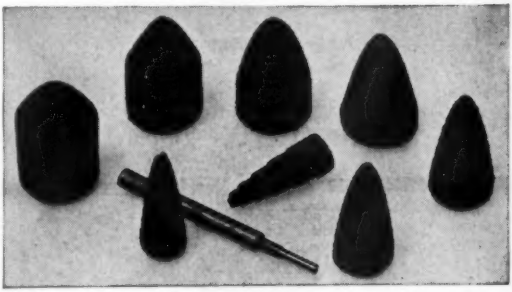
Metal Boxes

Where boxes are being made of relatively heavy plate, to be used for handling parts by crane, or for similar purposes, all sides and ends are gotten out separately and then arc-welded together, in the majority of cases. Making the box is largely a problem of developing a good box-welding jig. When boxes are made of sheet metal, however, they are usually notched and folded.

Different methods of assembling sheet metal boxes have been used. Something

Spirapoints Speed Hard-To-Get-At Jobs

Here's a help on hard-to-get-at jobs.



Realizing need of a pointed tool as affording better results in many cases where abrasive cloth pencils are usually employed, Behr - Manning, Troy, N. Y., Division of The Norton Company, has developed Metalite Cloth Spirapoints, described in literature just released.

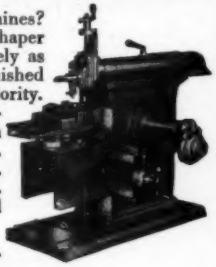
They are spirally-wound, abrasive cloth points, conically formed, and in wide variety of shapes to conform to odd surfaces and get into hard-to-get-at places. Pre-tapered for the job, Spirapoints depart from cylindrical pencils, in doing away with time-consuming work of putting noses on them. Spirapoints come all ready for the job . . . solidly-wound and glued thruout. They are, according to the makers, tools for rapid cutting, finishing and polishing jobs not easily done by other tools. Their ability to break down, automatically renews cutting faces, says the firm; their cone shapes are said to offer better cutting angles than straight pencils and other tools.

Descriptive literature, available on request from Behr-Manning, details results in applications of the new specialty to today's production problems, such as on the irregularly-shaped areas of supercharger impellers, illustrating the advantage Spirapoints afford in added cuttting surface contacting the work. Cited is an instance where, in cleaning and polishing cast aluminum intake manifolds and chambers of cylinder-heads, 1 Spirapoint did work formerly done by 3 pencils of comparative size. They also, according to the firm, proved themselves superior to set-up bobs for cleaning exterior edges, removing burrs from holes, and general polishing on airplane motorheads. Here, it is claimed, the average was 1 Spirapoint to 3 heads, whereas from 2 to 3 bobs were formerly needed for this work.

Spirapoints in grits No. 50 and finer, are supplied with ⅛" hole to fit threaded mandrel with ¼" shank and ⅛" pilot. Grits No. 36 and 40 are supplied with 3/16" hole to fit threaded mandrel with ¼" shank and 3/16" pilot.

SHIPPED THE DAY YOUR ORDER RECEIVED!

Why wait for machines? This 10" Lewis Shaper shipped immediately as plain or semi-finished castings, on low priority. Complete the balance of work in your own shop . . . save TIME . . . save MONEY. Cost—1/5 usual price.



Write for quotation.

Lewis MACHINE TOOL CO. Castings FOR THE TOOL BUILDER

Dept. Z-23

P.O. Box 116, Sta. A, Los Angeles, Calif.

NO OTHER MILLER HAS ALL THESE FEATURES

1. Hydraulic Feed. **2.** Hand Feed. **3.** Vertical and Angle Spindle. **4.** Horizontal Spindle. **5.** 3 High Spindle Speeds. **6.** 3 Low Spindle Speeds. **7.** Revolving Turret. **8.** 16" Vertical Travel. **9.** 16" Longitudinal Travel. **10.** 8½" Cross Travel.

Entire tolerances held to less than .001

ARMOR UNIVERSAL TURRET MILL

AIRCRAFT MACHINERY CORPORATION
BURBANK, CALIFORNIA

Bosses

Supervisors are not meant. We refer to the type of boss which is nothing more or less than a projecting portion of metal on the main body of any metal product. Such bosses may be used in different ways. By boring them, slitting them two ways, and machining them with an external, tapered thread, they may be used as clamp-type mountings for the ends of round parts, by running taper-threaded nuts onto them, to furnish the clamping action. In some cases, where it is desired to impart a swinging or reciprocating motion to various machine parts, a boss may be used to provide a bearing point for an actuating cam. In such a setup, the cam should actuate the member in one direction against the resistance of an extension spring, or other automatic-return device.

The chief use of bosses is to provide mounting points for various other members which are to be assembled to the main metal body, or to provide greater thickness of metal to give additional threading room, for set-screw thread strength, or for strength in a threaded mounting. Automobile engine blocks provided an outstanding instance of the incorporation of a number of bosses. It being necessary to mill the faces of these bosses, a distinct production problem was on hand if it was to be done with economy. For there was only a bit of milling at each boss, and there were usually a considerable number of bosses over the side of a block.

EDITORIAL NOTE: Machines mentioned, and makers identified on request.

Spiegel Coolant Pumps

A complete line of portable coolant pump systems known as Spiegel-Spray is being manufactured by the G. B. Spiegel Corp., 3958 S. Calumet Ave, Chicago. Suitable for 24-hour production use on lathes, screw machines, drill presses, grinders, milling machines, for various finishing operations, tapping, etc. Pumps range in capacities from 150 to 1500 gph with tanks from 3-½ to 15 gal.

Special features claimed by the manufacturer include: non - clogging centrifugal pump with no gears or close-fitted parts to wear or jam; no metal - to - metal contact; removable strainer; completely portable, self-contained unit; accurate flow-control valve delivering wanted amount of coolant, with spray nozzle to deliver coolant exactly where it is needed.

It is said that the pumps greatly speed up production and increase tool life as much as 300%, according to tests in actual shop operations.

The manufacturer also indicates that special units are made to order—with special sizes or shapes of tanks, larger or smaller pumps or units engineered for specific uses.

DANLY PRECISION DIE SETS
THEIR PRECISION
Means Greater Accuracy In Your Production
Danly Commercial Sets
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DANLY MACHINE SPECIALTIES, INC.
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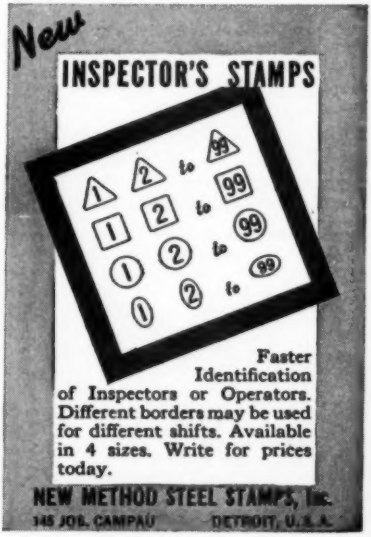
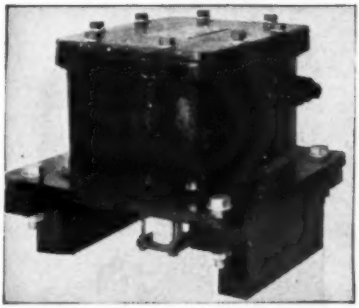
DANLY PRECISION DIE SETS


New
INSPECTOR'S STAMPS
1 2 to 99
Faster Identification of Inspectors or Operators. Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.
NEW METHOD STEEL STAMPS, Inc.
145 JOS. CAMPAU DETROIT, U. S. A.

Detector for Inerteen Transformers

The HCL detector for Inerteen transformers, a new method of protection which minimizes damage to transformer windings by its quick detection of very small arcs, is announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.



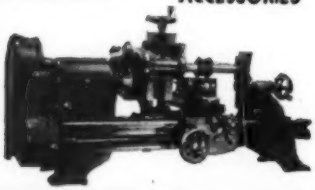
This protective device, said to be more sensitive and faster in operation than conventional pressure relief devices, was developed by Westinghouse research engineers. It may be used to give prompt warning of even very small arcs by detecting the presence of HCL gas formed by the decomposition of the liquid. Because the detector operates almost as soon as the arc occurs, it reduces the possibility of high pressures forming within the tank. For example, the HCL detector will operate in approximately 85 seconds from a 1 kva arc, when pressure might still be less than 2 psi.

The HCL detector can be used to operate an alarm, or to operate the circuit breaker, thus disconnecting the transformer from the feeder. It is easily installed on new or existing transformers.

GLOBE • GLOBE • GLOBE

The Globe Miller

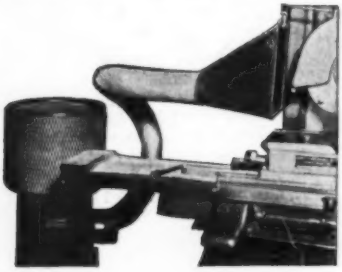
AND METAL CUTTING ACCESSORIES



Quickly converts your lathe into an efficient milling machine. With its accessories, it performs practically any milling operation accomplished by heavier, costlier milling machines—plain and angular milling, slotting, slitting, keyway cutting. Increases swing of your lathe 5" or more, permitting larger turning operations. Portable, requires little space. *Write for detailed folder.*

GLOBE PRODUCTS MFG. CO.

3380 Robertson Blvd. Los Angeles, Calif.



STOP DUST from GRINDERS with DUSTKOP

LOW COST DUSTKOP collects dust from Surface, Tool and Precision Grinders . . . Compact, self-contained ½ hp motor and fan . . . Easily renewable, spun-glass filter cleans and returns air to room. Saves heat. Prompt deliveries of standard units on high priorities. *Write for Bulletin A-500*

AGET-DETROIT MFG. CO.

2042 Book Tower CA. 3090 Detroit

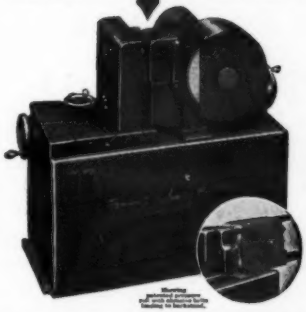
Air Operated Chucking Device

Drill presses, as well as lathes and vertical milling machines, are quickly made into production machines by the use of Anker-Holth Mfg. Co., Chicago, air cylinders and air operated chucking devices. Shown in the illustration is a drill press equipped with the new Anker-Holth combination air cylinder and air operated, three-jaw, universal chuck used for performing all internal machining operations on 40 mm M 48, high explosive shells. These combinations are now being made by Anker-Holth in sizes from 37 mm to and including 75 mm.

These combination air cylinders and air operated chucks are made in sizes from 6 to 15", for air pressure up to 100 lbs. Total jaw travel for the 6, 8, 10 and 12" chucks is ¾", and 1" for the 15" size. Jaw pressures range up to 75,000 lbs. The chuck will grip either internally or externally. Operation is either by foot or hand valve.

Buy U. S. War Savings Bonds and Stamps

Hammond
OF KALAMAZOO
CYLINDRICAL FINISHING MACHINE



FOR ¼" TO 9" OUTSIDE DIAMETERS
RODS, TUBES, BARS, VARIOUS CYLINDRICAL SHAPES

New, faster Grinding method utilizing surface coated abrasive belts, as well as wheels, makes the Hammond "OD" (outside diameter) Cylindrical Finishing Machine effect striking savings and greatly increases production rates.

WRITE FOR BULLETIN GP-11

ALSO: Grinders; Abrasive Belt Surfacers; Polishing Lathes and Rotary Automatics

Hammond Machinery Builders INC.
★★★ 1614 Douglas Avenue ★★★
KALAMAZOO MICHIGAN
Eastern Branch—71 West 23rd Street, New York, N.Y.

OLIVER
DIE MAKING MACHINES

THE basic needs of faster, smoother sawing and filing are met with the Oliver Die Making Machines. Operating efficiency is increased 50 to 60 per cent over hand methods in the making of precision dies, gages, cams, templates and similar products requiring rapid and accurate filing, sawing and lapping operations.

Send for literature describing the line of Oliver Die Making Machines!

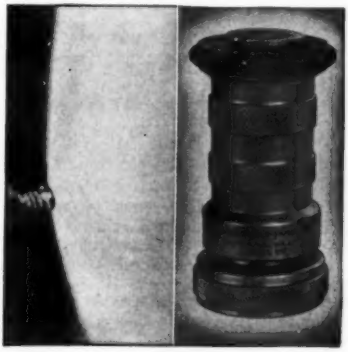
●

OLIVER INSTRUMENT COMPANY
1408 Maumee St., E. - Adrian, Mich.

We also build Drill Grinders, Tool and Cutter Grinders, Face Mill Grinders, Template Tool Bit Grinders.

All-Spray Nozzle

To meet demands for a variable, all-spray stream, a new water spray nozzle, the "Alfco-spray," is announced by American-LaFrance-Foamite Corp., Elmira, N. Y. From shut-off position, a slight turn of the tip immediately gives a cone spray of 40 degrees. Further slight rotation produces increasing cones up to full curtain of 150 degrees, with reversal back to shut-off without any intervening straight stream. It prevents possibility of a solid water stream being applied inadvertently on live electric circuits. The varying cones are also excellent for extinguishment of heavy oil fires, and for general cooling purposes.

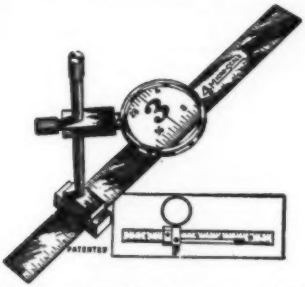


Because of the volume of water this new nozzle can handle, and the wide area covered by its spray, it offers excellent protection against possibility of spreading fires as a result of incendiary bomb attacks, especially in industrial plants where large areas can be thoroly wet down quickly.

The nozzzle is known as Model 10F. It can be furnished for any 2½" hose thread, also for Underwriters' tip thread, 2" hose thread, or 1½" thread.

In the 40 degree spray position, capacity is about 95 g.p.m. and 135 g.p.m. at 50 lbs. and 100 lbs. inlet water pressures respectively. Full curtain capacity at these pressures is approximately 170 g.p.m. and 215 g.p.m.

"Micro Scale"



A new "Micro Scale" is manufactured by the Leonard Engineering Co., Capitol View, Md., and distributed by the L. V. Fox Co., Inc., Washington, D. C.

It is said that with this, the tool maker can easily see such fine divisions as a 64th, which is magnified to about 4 times its normal size! This permits working to a few-thousandths easily, since it becomes possible to split a 64th with the scriber. The "Micro Scale" should be an asset to the beginner, the oldster, the inspector and all others who have trouble measuring center distances accurately with an ordinary scale.

The scale is so constructed that it lies quite flat on the surface block, has a patented, unbreakable plastic lens, which focuses and slides along the scale, and can be carried flat in the pocket. This scale should find a place in the tool box along side the micrometer.

Aluminum Welding Equipment

Available from Progressive Welder Company, 3050 East Outer Drive, Detroit, is a 4-page bulletin, (No. 101), describing the company's new line of "Revers - O - Charge" welding equipment designed for welding of aluminum alloys.

The line includes both rocker arm and pedestal type welders. A feature of the latter is a built-in refrigerating unit for electrode refrigeration. Included in the description are details of the "Revers-O-Charge" condenser discharge control unit.

TRINDL SUPER INDUSTRIAL ARC WELDERS

IMMEDIATE DELIVERY

On all Trindl Welder models on properly extended priority ratings.

Model No.	Amp. Cap.
125	125
160	160
260	240
360	350

Approved for High Speed Production Arc Welding

Years of careful engineering and "job tested" research have developed these outstanding machines, which are noted for their economy, performance and dependability. Trindl Welders are now manufactured in a range of distinctive sizes to accommodate every type of shop and production welding job. There are Trindl Welders, accessories and supplies for all requirements. Write, wire or phone for detailed specifications and prices.

TRINDL PRODUCTS, LTD. 2227-D CALUMET AVE. CHICAGO, ILL.

STEEL BOXES

FOR *Immediate Shipment*

No. 201 Straight side Shop Box
6"x9"x3½"—20 ga.... **45c Ea.**

No. 202 Straight Side Shop Box
8"x12"x4"—20 ga.....**50c Ea.**

Style 200
A Straight Side Shop Box with drop handle each end. Excellent for general use where stacking feature is not required.

No. 301 Stacking Box
6"x9"x3½"—20 ga.....**55c Ea.**

No. 302 Stacking Box
8"x12"x4"—20 ga.....**60c Ea.**

Style 300
An ideal all purpose shop box. Sturdy all welded construction. Skids act as positive stacking lock and re-inforce box at point of maximum wear.

AMERICAN METAL WORKS, INC.
1502 GERMANTOWN AVE. PHILA., PA.

Coolant Pump

Unusual adaptability is announced by Brady-Penrod, Inc., 1210 West Second Street, Muncie, Indiana, for its new Model 7500 Coolant Pump. It may be made an integral part of any grinder, lathe, cutting or drilling machine or can be easily moved from job to job as needed.

Features of Model 7500 are: Plate adapter enables pump to fit any tank or base opening. Available in 3 different depths from flange—4-⅞", 9 and 15". Also made in special depths. Motor capacity—⅛ to 1-½ hp. Controlled flow of any standard coolant fluid, from 4 to 100 g p m. Suitable for use with abrasives.

Pump is a motor-driven, open impeller centrifugal type, submersible, with outside discharge. Internal piping eliminated; external piping reduced to a minimum. Simple and easy to install, saving engineering and assembly labor.

"KEEP 'EM FLYING"
Buy U. S. Defense Savings Bonds

Subcontracting Epic

"It was like prohibition days. We had been speeding from one spot to another since early in the evening. Some were right in the city; behind painted-out shop fronts on Broadway; others were planted away out on the Kansas prairie. Now it was after midnight and we were searching for a special place up an alley on the other side of the tracks. We spotted it by the cluster of cars outside; when we got out we could read the big sign painted over the front doors: Chicken Hatchery. The building was of concrete and looked as if it might once have been a garage.

We walked around to a side door and rang. Presently the guard came, and we identified ourselves and were admitted to a sort of dim vestibule and then into the place itself . . . . " This, from description of a tour of subcontractors, by Denver Linley, writing in Collier's, on "War In The Heart of Kansas", where the yeomanry has set itself to conversion with a gusto destined long to live in the epic of American mobilization.

Bottlenecks, which threatened when Beech and Boeing got into production, at Wichita, on the huge army transport gliders . . . troop-carrying, motorless planes, with capacity of 15 men or 6 men and a jeep . . . were quickly wrung by small shops and even farms qualifying for subcontracts.

You might think that planes and gliders are being made everywhere in Wichita. That's about right, except that you've got to be told where to look, says Linley. The subcontracting business is neatly tucked away, out of sight. Its extent is very considerable.

It resulted from prime contractors pooling all available machinery and facilities over a wide environmental area. Thousands of machines were unearthed . . . most of them in good condition. After that, the contractors breathed easier . . . they knew the abilities of the men who owned these tools and had kept them in A-1 condition for years, many for generations . . . and they're coming thru for Victory!

BOYAR-SCHULTZ PROFILE GRINDER No. 2

For Contour Grinding in Production

Designed for intricate contour and profile grinding in tool and die work, Boyar-Schultz Profile Grinder No. 2 is now making a noteworthy contribution to the war effort on the production lines of plants making aircraft, guns, tanks and other heavy munitions.

With two grinding spindles, each operating at 10,000 R. P. M., this Grinder is a specially versatile machine tool—one that fits into efficient production as readily as it had in tool and die work.

Write Us For Full Information and Literature

BOYAR-SCHULTZ CORPORATION
2108-P Walnut Street CHICAGO, ILL.

A GIANT WORKER
SAVES THOUSANDS OF HOURS DAILY

GROB FILING MACHINE

"THE TOOLMAKERS BEST FRIEND"

INDISPENSABLE in every shop. It cuts with a continuous flow of chips and removes stock like a milling machine . . . . . FASTER PRODUCTION WITH HIGHER ACCURACY . . . . .

Write or wire for details and prices

GROB BROTHERS
GRAFTON WISCONSIN

DIAMONDS *for Victory*

BIG-HED-NIBS
LOC-KEY-SET
RE-SET-ABLE

Grinders instruction card free.

Cooler dressing
Closer tolerances
Micrometer Accuracy

Because: Wing key *heat dissipation* and *absolute* diamond lock nib.

• Three grades of diamonds. Common quality $12 per karat. Medium quality $24 per karat. Select quality $48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)
• All diamond sizes ¼ to 10 karat are nib mounted for immediate shipment . . . Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service, $1.00 post paid.)

Send specifications and prints for prices on turning and boring form tools.

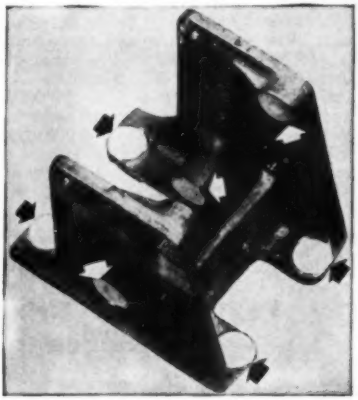
DIAMOND TOOL COMPANY, Not Inc.
Sheldon M. Booth, Pres.
935 E. 41st Street CHICAGO, ILL.

THE PRECISION UNIVERSAL TOOL HEAD

brings all adjustments under absolute micrometric control of the operator without stopping tool or machine. In Jig Borer, Milling Machine or Horizontal Boring Mill, it bores, faces, counterbores, turns outside diameters, mills flat surfaces and slots, under-cuts, recesses, back-faces and does an almost limitless range of "headache" jobs. Send for bulletins. Address all communications, inquiries and orders to

THE PRECISION TOOL COMPANY
P. O. BOX 155, BROOKLYN, NEW YORK
Cable Address: "Pretool-New York" Tel: MAin 4-1064

Masking Aid



A new method of masking particularly effective when mask area is small is afforded in Kum-Kleen stickers. Provided with self-adhesive backing, they are said to be effective for this purpose. They are quickly applied without moistening to metal, glass, plastic, wood, or any smooth surface, and may easily be peeled off, after operation is completed, without scraping or tearing.

While standard sized labels fit many normal masking jobs, special sizes and shapes are made to specifications. Much time is saved in having a mask cut to exact requirements.

Avery Adhesives, 451 East Third St., Los Angeles, Cal., are the manufacturers.

A Clean-up Wagon

Broom, pan and wheelbarrow has been about the only way to do the sweeping, even in the modern plants. It dates back to when manufacturing began . . . but now the Moto-Mower Co., 4600 Woodward Ave., Detroit announce that they have adapted their tractor to a third purpose, viz., factory sweeping. Here is an equipment, said to be the equal of a whole crew of sweepers to blitz cleaning troubles. It is consistent with modern shop practice that men with brooms be replaced with a mechanized method. Moto-Sweeper releases them to do other work around the shop and relieves industry still more of the burden of non-productive labor. It is easy to operate for it turns right or left under its own power, by means of a separate clutch on each wheel of the tractor, controlled at the handlebar. While many of them have already found their way into the aircraft industry with their great areas.

Illustration shows Moto-Sweeper at work in a medium sized plant, devoted to the manufacture of jigs and fixtures. Heavy metal machinings are easily picked up as the lighter dust and dirt. For the plant with great floor space—a sulky is available as optional equipment. Other innovations that have been added to later models are a spray which can be adjusted so that it just lays the dust but doesn't wet the floor and a heavy bumper for the larger models. There are 3 models (2 are motorized).

Revised Di-Acro Catalog

Featuring 2 new products, O'Neil-Irwin Co., Minneapolis, announces a revised Di-Acro Catalog, No. 42-2, on the firm's line of precision hand-operated brakes, shears and benders, for metal-duplication without dies.

Demand for the first Di-Acro catalog, printed March, 1942, exceeded expectations, making the revision necessary, according to A. T. O'Neil, sales manager.

The 2 new models are Di-Acro Brake, No. 3, 18" capacity, and Shear No. 2, of 9" capacity, developed to meet demand for greater range than smaller sized Di-Acro apparatus, says the firm.

The equipment is widely-used in production of small parts, where many are to be made individually—yet, not enough to justify dies.

STANDARD TOOLS FOR SAVING TIME

NICHOLSON EXPANDING MANDRELS

TYPE A—STEP JAW DESIGN

Especially adapted for holding work with small bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bores Taken	Net Price
1A	½" to 1"	$12.00
2A	1" to 1½"	16.00
3A	1½" to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00

TYPE B—STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

Size No.	Range of Bores Taken	Net Price
1X	½" to 9/16"	$10.00
2X	9/16" to 21/32"	11.00
3X	21/32" to ¾"	12.00
00	¾" to ⅞"	14.00
0	⅞" to 1"	16.00
1	1" to 1¼"	18.00
2	1¼" to 1-9/16"	21.00
3	1-9/16" to 2"	29.00
4	2" to 2½"	40.00

(Other Sizes Taking Up to 7" Bores)

Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.

W. H. NICHOLSON & CO.

117 OREGON STREET

WILKES-BARRE, PA.

Flud-Lite Magnifier

Equipped with fluorescent daylight lamps, plus 5" diameter, high quality lens, 2 new Stanley magnifiers provide full, magnified vision, within 13" focal length. Designed to function in a wide range of applications . . . inspectors, machinists, toolmakers in war production will find them efficient aids. They are also recommended by the makers for others engaged in "close" work, or where there is need of magnification.

Frame and arms are die-cast and ribbed for strength and durability. Base and frame swivel-joints and friction-arm joints afford universal movement for positioning. Rotary light-switch is mounted in frame.

Two models are made . . . one for benchwork, use on conveyor belts or on machines, equipped with 6 feet of approved cable, and with base removable, for permanent fixability. The other is a portable model, with hardwood handle and 6 feet of cable.

Both operate only on a-c, 110-120, 60 cycle current.

Full details may be obtained from the maker, Stanley Works, Electric Tool Div., New Britain, Conn.

Cannon Bonding Ring

The Cannon Electric Development Co., Los Angeles, has just released a Bulletin on its new Bonding Ring.

The Cannon Bonding Ring may be used wherever there is a need for bonding between electrical plug shell and wire shielding, and may be used with either Flexible Conduit Coupling Nut or Cable Clamp.

Clothing for Women Welders

To meet the needs of the many women welders now employed and being trained, General Electric Co., Schenectady, N. Y., announces a complete line of safety clothing designed especially for women welding operators. Safety, durability, and smart styling are combined in the new line which is based on the results of an extensive industrial survey of safety requirements for women welders.

Featured in the line are leather sleeves, aprons, jackets, leather gloves, and a special women's head and hair covering. Designed by Sally Victor, one of the country's leading milliners, this head covering protects the hair from sparks and slag and can be used with any of the modern welding helmets.

All items in the line are of high-quality material, comfortable, and light in weight—yet they provide full protection for all parts of the body. The new line supplements G.E.'s complete line of apparel for men welders.

A new bulletin, GEA-3295, gives complete details and specifications on G.E.'s new line of safety clothing for women.

LINCOLN UNI-MILL *takes any* HIGH SPEED Milling Head

- **The ideal high-precision, heavy duty, hand-feed machine that will handle most jobs—and many that no other machine of its size *can* handle. Releases heavy power-driven milling equipment for other essential jobs.**
- **Unusually large table—10"x42"—permits 30 inch cut.**
- **Heavy construction—weight without head 2300 lbs.**
- **Accommodates any make of high speed milling head. Supplied with or without detachable head.**

***Write for illustrated bulletin with complete specifications, or telephone* State 3213.**

LINCOLN MACHINE SPECIALTY CO.
549 WEST WASHINGTON ST. - - - CHICAGO, ILLINOIS

Plants for Subcontract Work

HERE are additional plants with machine tool capacity available for subcontract work. Code numbers are used in lieu of names for obvious reasons. Addresses are at all times available for Goverment Officials, prime contractors and responsible manufacturers.

Address all communications to Subcontract Dept., Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, Ill. (Phone HARrison 6040).

If you have any idle tools in your plant, send a description of your plant and list of tools for listing. It is a patriotic duty for every plant to respond to Donald Nelson's appeal for additional subcontract capacity. There are no charges or obligations involved in connection with listing your subcontract facilities in The BLUE BOOK. It is our gratuitous contribution to help speed the American All-Out Victory Program:

H-58—Non-ferrous foundry in Texas, normally making bronze bushings, brass plumbing fittings. etc., has capacity available for subcontract work. Equipment includes pit furnace with capacity of 250 lbs per melt; 2 Floor type stationary type furnaces, capacity 250 lbs per melt; Tilting furnace with capacity of 1000 lbs per melt; 500 lbs capacity; Sand blast handling castings up to 5' diameter; 2 stationary grinding wheels; 2 small core ovens; large core oven, 6 x 6 x 12'; 2 portable electric sand riddles; pyrometer. Can make castings up to 500 lbs each. Depending on type of castings, can melt approximately 20 tons of metal per month, operating one shift.

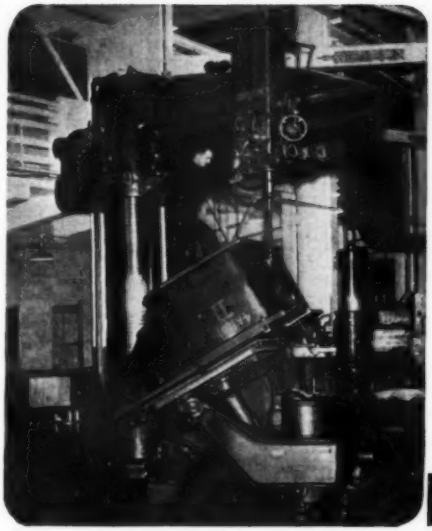
H-57—Pennsylvania machine shop has following tools available for subcontract work: —American 24"x10' engine lathe; 26" Barnes sliding head drill press; 16" Hendey shaper; 6" Power hack saw; 2 Floor stand grinding wheels; also foundry to make 1 to 300 lb castings.

H 56—Georgia machine manufacturing company has Grenby internal grinder; 4 Milling machines; 3 Lapping machine; Hardening and heat treating equipment; 4 Turret lathes; 6 Engine lathes; 3 Shapers; miscellaneous drill presses, punch press, bench tool equipment, etc.

H-55—Milwaukee firm has a new 900 ton Clearing hydraulic press, which because of material shortages exceeds their capacity needs at present. It is of open column construction with single pressure down-moving stroke. Bed area (r to l x f to b) 80" clear x 80"; slide area (r to l x f to b) 80 x 80"; distance between columns is 80 x 56"; stroke is adjustable being 30" maximum; shut height is 20" and cushion stroke, 14"; maximum pressure is 900 tons; net punch pressure is 450 tons; lifting capacity is 30 tons; cushion pressure in clamping is 450 tons; in stripping, 60 tons; speed on approach or closing stroke is 240" per minute; high pressure stroke 8" per minute; return stroke, 200" per minute.

H-54—Pennsylvania engineering concern has following equipment available for subcontracts: — Hendey lathe 14" swing 36" between centers; No. 0 B&S Universal Milling Machine; Bench lathe 5" x 18"; Cincinnati Drill Press, back geared, drilling up to 2"; Excelsior 2A Power Hack Saw; Bench Drill Press; Metal Cutting Band Saw, 20" throat; Baird Punch Press; small gas hardening furnace; large assortment miscellaneous tools including drills, taps, dies, reamers; B&S Surface Plate 12" x 12"; Taft-Peirce Right Angle Plates; Ames Dial Gage; Micrometers, Vernier Calipers and Vernier Height Gage. Will work to any commercial tolerances.

H-53—Connecticut firm that has specialized on new development work, designing, building, research, etc., offers its facilities for any job requiring skill and inventiveness. Instrument shop tho small has a variety of precision tools including: 3-foot bench lathe with milling attachment and boring devices; jewelers precision lathe and attachments used for making optical precision instruments; ½" drill press; scroll saw; filing machine; gas welding equipment; also completely equipped laboratory for photo and optical work of any kind (metallography for example). Recently developed tool projector for profile and surface projection and a new optical comparator.

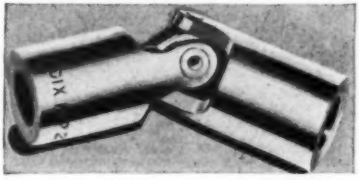


C-F Positioners
reduce set-up time

Designed to revolve and tilt weldments so that all sides can be welded "down hand," C-F Positioners are also being used to speed war production in machine shops. Because they can revolve work completely around or tilt to any angle up to 135° off horizontal they greatly reduce setting-up and handling time, permit (as illustrated) drilling straight and angle holes on 4 sides and top with only one set-up.

Write for Bulletin WP 22.

CULLEN-FRIESTEDT CO.,
1251 S. KILBOURN AVE. CHICAGO, ILLINOIS



Announcing a Dix precision-built Universal Joint for every purpose, the Dix Mfg. Co., 603 E. 55th St., Los Angeles, Cal., lists some 15 standard sizes of their new improved Universal Joints with hub diameters ranging from ⅜ to 4" and approximate weights of from 5/100ths of a pound to full 31 pounds each.

The steel used in Dix Universal Joints is described as a special high-quality alloy steel treated and hardened to the correct degree, machined and ground to miscroscopic accuracy and capable of passing the rigid Army, Navy and Air Corps specifications. Due to the design and construction, Dix Joints are said to operate at a greater angle than other similar joints. Incidentally, Dix Mfg. Co. as a prime contractor to the U. S. Government employs one of their 3 complete production plants for the exclusive manufacture of special Aviation Type Universal Joints for top performing military fighters, bombers, transports and trainers.

Dix Universal Joints

Crucible Steel Booklets

In offering its 2 new booklets, "Cold Rolled And Cold Drawn Specialty Steels", and "Tool Steel For The Non-Metallurgist", Crucible Steel Co., Chrysler Bldg., New York, renders available 2 timely, informative monographs.

These handy, pocket-sized booklets treat of qualities and varieties of steels and their preparation for various special purposes, giving important tabular information which steel specifiers and operators find convenient to have at their finger tips.

Clayton Announces Large Type Boring Bars and Holders

Featuring a unique dial clamping arrangement that separately holds boring bar in the holder and holder to the lathe, the Clayton Mfg. Co., Alhambra, Cal., announces production of large type Bars and Bar Holders for lathe swings from 9" to 36". The special design of the holder, allowing removal of holder from lathe without disturbing alignment of boring bar, saves a considerable amount of time as well as increases accuracy of duplicate operations.

Another time-saving feature of the Clayton Boring Bars and Holders, are permanent calibrations on the bars, which eliminate need of file marks or chalk markings. These calibrations are engraved into each end of the bar for some distance back from the tool bit holes in ¼" calibrations, thereby eliminating need of file marks which require time to make. The bars are far more rigid, chatter is eliminated and it reduces the likilihood of errors. thru use of the wrong file marking.

With the Clayton holder, which has a separate clamp for attaching holder to lathe compound, it is possible to maintain the same tool height and bar stick-out in such duplicate operations as boring, turning and cutting of bushings, since the bar need never be removed from holder when holder is removed from lathe. The Clayton holder is the only one offering this time-saving advantage.

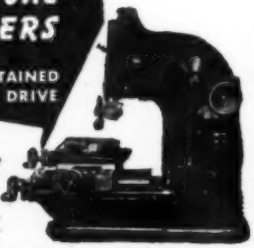
The bits are held in position with Allen screws, thus preventing damage to tools thru use of wrenches on the cutting edge to remove the tool bits.

Accurate, High-Speed

MOREY VERTICAL SHAPERS

SELF-CONTAINED MOTOR DRIVE

8' STROKE
12' STROKE
14' STROKE



FEATURES

Precision...Easily handled — your operators will appreciate it...Cutting Stroke changed quickly ...Feeds varied instantly...Power rapid traverse in all directions...Brake for ram automatically applied... Bijur Lubrication... Timken Bearings—Bull gear mounted on Timken Bearings. Roller table mounted on Timken Bearings... Modern Design—built to the highest standards of workmanship and materials—simplified operation, powerful yet finger-tip control...

DESIGNED & BUILT BY **MOREY MACHINERY CO., INC.**

Ask for Circular No. 726 410 BROOME ST., NEW YORK, N.Y.

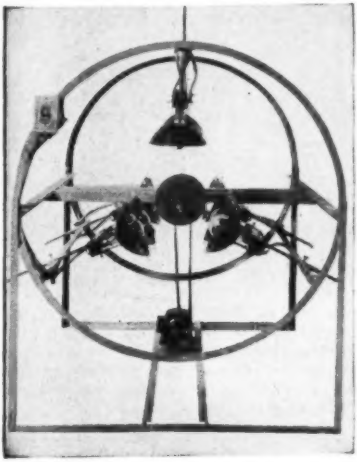
Nationally known Cutting Tool manufacturer has opening for Sales Representative in Rocky Mountain, Texas and West Coast Territories. Replies treated confidentially.

TRU-CUT TOOL CO.

14236 BIRWOOD AVE., DETROIT, MICHIGAN

Dryer for Polishing Wheels

A portable Infra-Red Ray Machine has been developed, which is claimed to dry polishing wheels 30 minutes after application of "head," compared with the 24 hours usually required in ovens.



Wheels can be removed from the production line, reheaded, and replaced in service within 40 minutes. This permits cutting down on wheel inventories, and using the same wheels more than once in a single day. Wheels pass 3 lamps in each revolution.

Lamps are adjustable to any required distance from the wheels, and various diameter wheels can be mounted on the drying shaft, by use of special bushings. There are no wet spots on wheels, and even drying is guaranteed. Small floor space is required, as the unit is 54" square x 66" high, and working height of loading shaft is 42" from floor.

12 gold-plated reflector lamps—240 watts, 115 volts each are used. Shaft is ordinarily furnished with 1" diameter. There are 2 control switches for adjustable lamps. 1/6 hp motor, single

USE KANTI-LEVER COUPLINGS

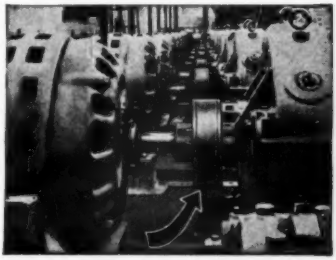
THEY HELP YOU

Maintain Peak Production

With your machines now forced to the limit to gain peak output, the necessity of stopping for repairs becomes much greater. You can prevent many of these costly interruptions of production by using KANTI—LEVER Couplings, for they have a scientifically designed Cushion Torque that absorbs sudden load shock and torsional vibration -- the two main causes of wear, fatigue and failure of machinery. The KANTI—LEVER is different from any other type and gives your machinery a protection that is vitally needed under present abnormal conditions. See cut showing 70 KANTI—LEVERS that have proved invaluable to their user by protecting the driven machines and enabling steady production for over 18 years.

Send for Bulletin 28-B describing

Kanti-Lever Couplings

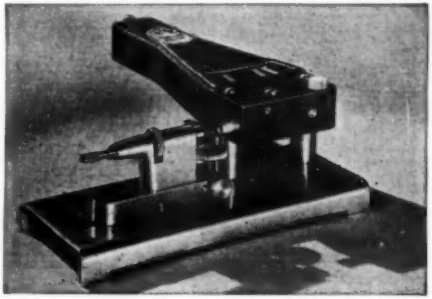


BROWN ENGINEERING CO., 126 N. THIRD ST. READING, PA.

phase, 60 cycle, 1725 rpm. Speed Reducer—60/1—working speed of shaft approximately 12 rpm; can be regulated to give other speeds, if necessary. Pillow block bearings—shaft 24" loading space, each direction. Unit is furnished with casters, for portability. Illustration shows framework with net housing.

Address Park Chemical Co., 8074-8110 Military Ave., Detroit, Mich., for further details.

Micro-Chek Speeds Gaging



One outgrowth of the effort of a Western New York manufacturer to convert his machinery and equipment to exclusive production of war material has been a device which was originally designed to meet a vast number of additional inspection requirements on precision parts.

The device has been developed to use a simple mechanism of levers to multiply the dimensions, and to put this multiplying device under the control of a push button. It is a comparator type of gage which is set by the use of 2 master parts, one having the limit of dimensional tolerance on the high side and the other having dimensional tolerance on the low side. Two lifting fingers on the instrument are set so that production parts may be compared to the master parts and arrive at the "go" and "no go" limits so as to check the production part for its "go" and "no go" limits simultaneously.

After putting the device into use in over 100 different inspection points, the manufacturer decided to distribute the instruments to benefit others engaged in kindred work, believing that adoption would not only speed up the work of inspectors who are expert, but likewise make it possible to develop more quickly a large added inspection personnel in industries where the advancing war program requires expanded personnel.

The makers assert that use of the new gage has shown reduction of fatigue among operators engaged in such delicate work.

The instrument is called a "Micro-Chek" and the manufacturer is in a position to ship promptly, the requirements of users who are able to furnish priorities for their tool needs. The manufacturer is Trico Products Corp., 27 Goodfellow Street. Buffalo, N. Y., to whom inquiries may be directed for literature, describing the instrument in detail.

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Increasing Inspection Efficiency

A combination Master Surface-Angle Plate is offered by Thomas Wilberton & Co., Cedar Grove, N. J. It is of close grained high strength Meehanite, affording an exceedingly durable wearing surface. Deflection which might be caused by weight of the piece being inspected, is prevented by the deep heavy ribs supporting the plate and the pedestal, thus assuring rigidity and stiffness. Weight is 2,000 lbs.

The old method of clamping an angle plate to the surface plate and then clamping the work to the angle plate is eliminated. This alone avoids the wear and tear resulting from the sliding of angle plates on the surface plate. It also means saving of many valuable inspection hours, as well as reducing chance of errors.

Note that even after the job has been affixed to the back of the plate, there is plenty of room to move a height gage and other measuring instruments. A sine bar may be used by inserting a stud thru one of the elongated slots and tightening from the rear, which means no parallel or clamps to make the job more awkward.

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Butt Welders to weld from .010" to ½" dia. metal. We make all kinds of Standard & Special TRANSFORMERS A. C. ARC WELDERS—100 to 400 Amps. LARGE or SMALL QUANTITY CONTRACT SPOT WELDING.

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EISLER ENGINEERING CO.
762 So. 13 St. near Avon Ave., Newark, N. J

Back plate is heavily ribbed and notched out to avoid strain on the large cap screws holding back plate to surface plate. The 90 degree angle is accurate and tolerances of the Plate are said to be held within .0001". Makers say the careful hand scraping leaves nothing better to be desired, having between 16 and 20 spots per square inch. Closer spotting can be had if necessary but is not advisable. Plates are available in floor and bench models. It is also made with a combination sine table and index plate which gives any compound angles for layout and checking of castings and foundry inspection. Surface Plate is 24x36"—Angle Plate, 18x19".

Sciaky Rocker Arm Resistance Welder

Sciaky Bros., 4915 W. 67th St., Chicago, offers a new Rocker Arm Resistance Welder, Type PMCR.2S16 for the spotwelding of aluminum and its alloys. It embodies all of the Sciaky features found in their regular line, such as "Stored Energy with Preheating and Variable Pressure with Recompression." Also it is said to offer several unique advantages over conventional type welders. These features include adjustable electrode tips which may be set at any angle without impairing their proper welding position. Such settings permit welding of unusual shapes and sizes of metals which heretofore could not be welded with ordinary welding machines. Another feature is that all gauges and dials are visible to the operator and are set on frame of machine. This provides greater flexibility in operation when using a wide range of shapes and designs as mentioned.

The welding process incorporated is said to compensate for the natural expansion that takes place when the metal is in the molten state during the welding process It is explained that the Sciaky process of resistance welding as here exemplified, preheats the metal, tending to overcome high

thermo conductivity, thus slowing down the cooling process and providing an added protection of a "forging" pressure which in itself precludes the possibility of shrinking the metal after the weld. This rocker arm machine provides the same weld settings as those embodied in the standard Sciaky types. Thus the operator of one machine can readily operate the other with exactly the same training, since the welding charts are applicable to both. This machine supplies a total pressure of 3,000 lbs between the electrode tips from a supply line of 90 lbs, using normal throat depth of 34". It has a welding capacity of .080" plus .080", 24ST Alclad. Welding stroke is ½" and retraction stroke 3½". A special face plate at 45 degrees can be incorporated with the vertical face plate for special work.

Welding Transformer for War Production

Speeding production of war material has created manufacturing problems seldom if ever at all experienced in the production of peacetime goods. As a result much production machinery has been designed to perform specific operations or functions. As an example, The Acme Electric & Mfg. Co., Cuba, N. Y., announce development of special welding transformers for operation on primary circuits of 115 volts, single phase, 60 cycles and having secondary characteristics of 0.75 volt, 1600 amperes.

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173 MULBERRY ST., NEW YORK CITY

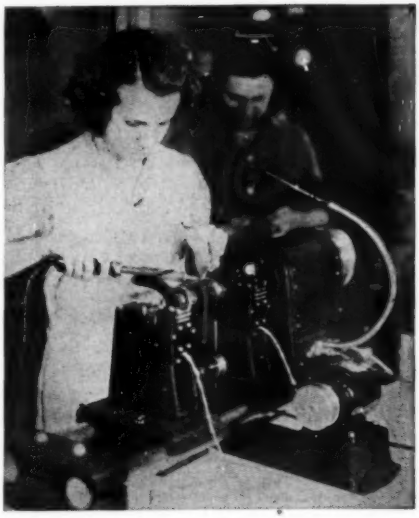
Annis Dynamic Balancing Machine

The unprecedented production of materials of mechanized war—ships, planes, tanks and guns with their associate control equipment has created a heavy demand for all kinds of high speed rotating parts that must be in true running balance to stand up and perform satisfactorily.

The Dynograph, a precision dynamic balancing machine developed by R. B. Annis Co., Indianapolis, Ind., is contributing to this job. As a result of interest shown by the armed forces in this new equipment, it is now available in commercial form for use on war work carrying high priorities.

The machine determines and indicates both the amount and position of unbalance in rotating parts, thru a single reading of the "trace" on the screen of a cathode ray tube.

The cathode ray tube is an inertialess electrical indicating device which responds instantly to voltages applied to its control plates. It has no moving parts and the tube employed in the Dynograph is particularly rugged.



Control voltages for the cathode ray tube are generated as a result of the rotation and vibration of the unbalanced part while spinning in extremely lightweight, free floating bearings. Rotation is accomplished by driving the part, under its own power, or from an external motor, with a light fabric belt thru a double idler arrangement.

Amount of unbalance is shown directly by the height of the trace on the scale of the cathode ray tube.

Position of unbalance is also shown by the trace, by indicating phase relation between the voltage produced by vibration and that produced by rotation. The control voltage, due to rotation, is produced by a special photoelectric generator which is "coupled" to the part being checked thru the medium of a **beam of light**, no mechanical coupling being necessary. A constant correction position (opposite the reference pointers) is obtained by turn-

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PRECISION TAPPER

Taps guided by precision leads. Class 3 & 4 specifications easily met. 4 speeds. Ball bearings throughout. Available as floor model (with coolant system) or table model.

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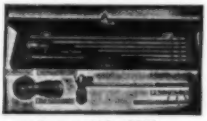
Highest accuracy and finest workmanship. Available 1½"—6" & 1½"—12" sets.



Brand Telescope Gauges ½"—2½" Handy Knurler, used like pair of pliers.

BRAND TOOL & SUPPLY CO.

344 No. Vermont Ave., Los Angeles, Cal.

ing the photoelectric generator, with the handwheel, so that zero phase relation is always indicated.

Only a few seconds are required for the operator to read the unbalance in either of the two selected correction planes. A right-left selector switch determines which end is being read..

An important feature of the Dynograph is that the scale may be calibrated easily in practical units of correction such as inches of solder or depth of drilled hole. The operator is also given immediate indication as to whether he has made too much or too little change in correcting the unbalanced part.

The Dynograph is quite flexible and may be adapted readily to various balancing jobs within its capacity. It is recommended, however, that a sample part, or parts, be submitted so that proper fixtures and tests can be made and the balancer completely set up for production.

This Balancer operates on the regular 110-volt 60-cycle lighting circuit. It is designed for bench mounting and with a 40" bed length, the maximum distance between bearings is 15" and maximum swing 14". The Dynograph is furnished complete with motor drive, tubes, belts, instructions and technical data, etc., ready for operation. Vibration isolation spring suspension mount, No. 24, is available where considerable extraneous vibration may be encountered.

Grinding Trouble-Shooter

"What's your grinding problem?" . . . Wheel Selection? . . . Mounting? . . . Diamond Dresser Costs? . . . Coolants? . . . Spoiled Work? . . . Wheel Breakage? . . . Short Wheel-life? If so, a newly offered booklet, "What's Your Grinding Problem?," issued by Norton Co., Worcester, Mass., gives answers to these and other grinding travails, devoting a chapter to each of the above questions, as well as to several others. It's a pocket sized booklet of 27 pages, invitingly printed, and fully informative on grinding wheel matters . . . well-worthy of a prominent place in the files of anyone responsible for grinding and grinding intelligence around the plant.

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Use KNU-VISE Pliers

To hold parts together for operations such as drilling, or riveting, Knu-Vise Pliers have proved exceptionally efficient because there is no time wasted in fastening or releasing them. One flip of the lever applies the required pressure and another flip releases the work just as quickly. Holding of work is simplified and production is stepped up. Let us show you efficient methods of holding parts for speedy production.

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KNU-VISE INCORPORATED

1334 PLUM ST., DETROIT, MICH.
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Southwark 3500-Ton Extrusion Press

Here is one of five, 3,500 ton extrusion presses recently completed by The Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia. Designed for both direct and indirect extrusion, this powerful press is equipped with a 250-ton hydraulic billet shear, 2 coarse tooth saws driven by 40 hp motors and a billet handling device to take the heated billet from the furnace and deposit it in front of the extrusion container.

The press' main cylinder casting weighs 200,000 pounds; the machine proper 1,000,000 pounds and complete with auxiliaries 1,500,000 pounds. It is of the 4-rod type, with forged tension rods 16" in diameter, weighing over 25,000 pounds each. The 59" diameter ram, under 3,200 pounds per square inch working pressure, will handle billets up to 24" in diameter and up to 36" long. Its working stroke is 7 feet. Main ram is rapid traversed to working position under a low pressure of 200 pounds. Press is operated from two 500 horsepower multiple plunger pumps in connection with the hydro-pneumatic accumulator system designed for 3500 pound psi hydraulic pressure.

In addition to these 5 large presses, 15 other such extrusion presses ranging in sizes from 2000 to 750 tons ca-

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One - Man Portability
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QUICKLY picks up chips, dust or water. Cleans walls, beams, machines, floors, boiler tubes and tops, molds, etc. Powerful—portable. A real one-man unit. Weighs only 40 lbs. Dirt capacity 12 gallons.

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Hardened and Ground Precision Parts

ACME INDUSTRIAL COMPANY
Makers of Hardened and Ground Precision Parts
210 N. Laflin St. Chicago, Ill. MONroe 4122

pacity are being built in the Southwark shops at this time.

Testing Spot Welds

A spot weld testing machine, to check strength of spot-welded samples, has been developed by The Baldwin Southwark Division of The Baldwin Locotive Works, Philadelphia, Pa.

For use in production line testing of light metal fabrication, this self-contained, motor-driven, hydraulic machine is extremely rapid and simple to operate.

Machine is equipped with specially designed, self-aligning, lever-operated, open face grips with renewable hard file faces. Grips accommodate offsets in welded specimens from the smallest gage to ¼" thick. No backing plates or liners are needed. Top and bottom handling levers are set at right angles for convenient operation. An 18" diameter steel base, and low center of gravity, facilitate hand moving of machine. Hoisting hood is at the top for crane handling.

An 8" precision dial set atop indicates load. Cylinders with a 2" stroke are also set in the top section. Machine has an overall height of 70" and a total weight of approximately 800 pounds.

Abrasive Cutting Book

Just off the press is a complete, up-to-the minute book called "Abrasive Cutting" which explains the development and application of abrasive cutting. Andrew C. Campbell Division of the American Chain & Cable Co., Inc., Bridgeport, Conn., offers this book to industrial men without cost.

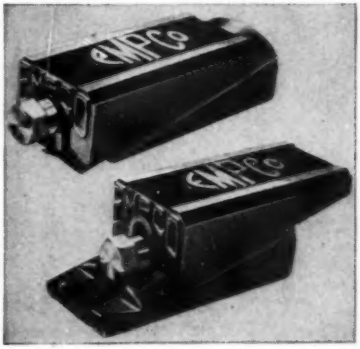
In this 32-page book are plenty of details, photographs and tables about

the operation of abrasive cutting machines. This is not a catalog the manufacturer explains. It follows the development of these machines from the dry abrasive cutting machine right up to the most modern wet abrasive cutting machine on the market today.

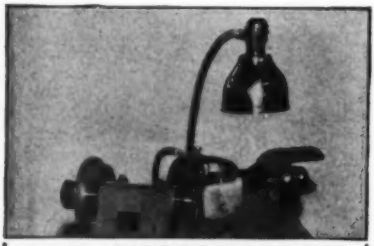
Typical of the material found in the book are these chapters:—Advantages of Abrasive Cutting, Comparison of Wet and Dry Cutting, Principles Governing Abrasive Wheel Efficiency, Effect of Wheel Speed on Wheel Efficiency, and Important Abrasive Cutting tables.

Empco Improves Leveling Jacks

The main features of the new type Empco Machine Leveling Jacks are evident from the illustrations. These handy gadgets solve the problem of machine installation on uneven floors. The slipways are ground to minimize friction at point of contact with the machine bases, providing a positive 2-way adjustment with increased limits. All that's necessary is to install the jacks and turn the hex screw heads until the required adjustment is attained. Turning the screw utilizes the inclined plane principle to raise or lower the machine base.



The makers are the Enterprise Machine Parts Corp., 2729 Jerome Ave., Detroit, Mich.



ADD VIMCOLIGHT
On-the-Spot Lighting
TO FLUORESCENT
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A most effective combination for encouraging still greater production . . . for conquering eye strain .... for reducing spoilage and fatigue. Designed by industrial lighting experts, — non-glare, flexible Vimcolights are **standard equipment** on hundreds of leading machine tools. Let us elaborate!

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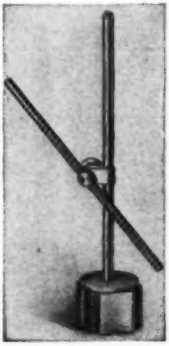
Windermere Magnetic Adapter



A new streamlined Magnetic Adapter for Dial Test Indicators, Surface Gages, and Gage Block applications is announced by the Windermere Mfg. Co., Inc.,

By removing the upright center post and collar, the adapter is transformed from an indicator holder, to a general work holding block that may be used to anchor parallel, angle iron, and work pieces in any given position. This is made possible because magnetic qualities are the same at both bottom and top.

Streamlined, it utilizes much less

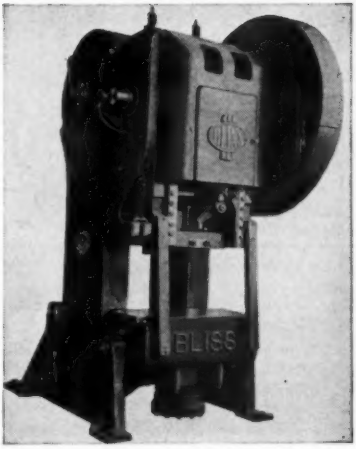
space than required by the usual base. Strength of the magnet is said to be more than ample to support the indicator at the extreme end of the center post in any position.

When used as an adapter or work holding block, the holding power is sufficient on top and bottom to provide a solid anchor, eliminating clamps and special holders. It is claimed to last indefinitely without loss of strength and is completely guaranteed.

Comes jn one standard size, weight, approximateely 20 oz., upright center post ⅜" or 5/16". Clamps for holding Indicator are also available. Distributors are Clutsom Machines, Inc., 205 E. 42nd St., New York City.

150-Ton Inclinable Press

A new Bliss Consolidated No. 9 Inclinable Press, as illustrated, is equipped with a Marquette pneumatic cushion. The press is of geared type, with main working parts either enclosed within the housing or in guards, designed for safety of the operator. It is driven by a 15-hp motor, mounted



inside the frame. Heavy, removable tie bars in front of the frame are aimed to keep deflection at a mini-

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More Important Today Than Ever Before?

If your product is one whose perfect functioning depends upon springs, spring testing is more important today than ever before-especially if the critical situation in metals has necessitated a change in your spring-wire analysis.

LINK SPRING TESTERS

For speedy and accurate testing of springs - compression, tension and torsion-LINK Spring Testers are the answer to your problem. Hand-operated instruments for service, laboratory and inspection. Also motor-driven instruments for production testing.

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READING BENCH KEYSEATER

Portable—move directly to job; a time saver for both small and large shops. 3¼" stroke; adaptable for other work. Low first cost—prompt delivery.

Good dealers wanted.

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READING (CINCINNATI) OHIO

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Manufactured to Army, Navy & Air Corps specifications. 15 standard sizes ⅜" to 4" hub diam. or to customer's specifications. Let DIX engineers quickly solve your problem. 3 complete production plants to serve you better. Write for detailed data. Prime contractors to U. S. Govt.

DIX MANUFACTURING COMPANY

mum. All heavily loaded parts are made of special high strength alloy material.

The press can be inclined 39° to allow completed work to fall by gravity to rear of the machine. Features claimed for this design are smooth-faced frame, enclosed operating mechanism, including clutch, flywheel and brake; clutch operating valves and electrical controls, together with a spring counterbalance for the slide, mounted inside the frame, giving neat attractive appearance. Press has an open-back gap frame, allowing feeding strip stock either right to left or front to back.

A new type lever and cam operated knock-out slide, with single adjustment at front of the press, is said to eliminate necessity for setting correct knock-out position at the rear.

Further information is available from the builder, E. W. Bliss Company, 53rd Street and 2nd Ave., Brooklyn, N. Y.

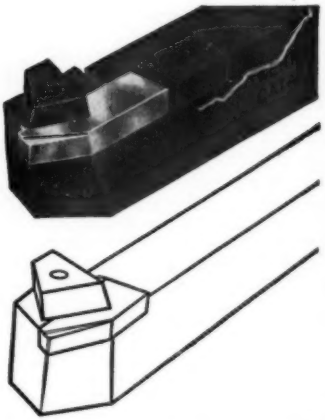
Clamped-on Carbide Tips

McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa., has made available a new type clamped-in carbide tipped tool to plants which machine steels.

This tool, style 51 as pictured and style 52 opposite hand, differs from the previous type clamped-on tool in that the clamp is secured by a screw which is inserted from bottom of the tool thru shank to top of the clamp. This feature eliminates any mechanical device at top of clamp which might hinder the most efficient use of the tool.

A flat surface is milled out of tool shank to accommodate cutting tip and the clamp holds tip in position.

This clamp should not be used as a chip breaker. Where a chip breaker is desired, it should be ground in the tip. As the tip is reground following use, it is moved forward and out under the clamp, shims being placed behind it. When the tip becomes too small for service in this tool, it frequently can be brazed into a small shank for lighter turning or boring operations.



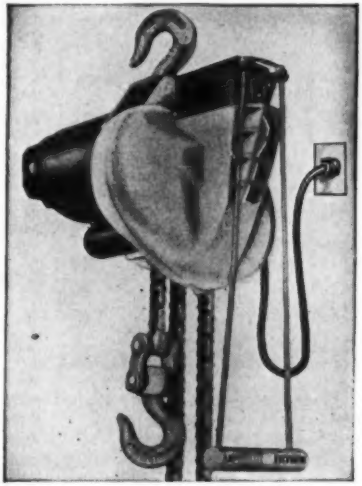
Because of elimination of brazing strain and because unequal heat expansion in tip and shank need not be considered, these clamped-on tools are said to double the production of the regular brazed tip on many jobs.

The clamped-on tip permits using a durable heat-treated shank, and better grinding results when tip only is touched to wheel. This eliminates tool "crazing" or "checking" of tool edges and grinding wheel does not become clogged or glazed.

Kennametal clamped-on tools are available in 3 square sizes 1, 1¼, and 1½" and in two flat sizes 1x1½" and 1½x2".

Midget King Hoist

The Yale & Towne Mfg. Co., Philadelphia Division, announce the Midget King Electric Hoist to help Industry save valuable time and speed production efficiency.



It is made to lift the following capacity loads:—⅛, ¼, ½ and 1 ton.

Every Midget King is tested to 50% overload before it leaves the factory. The cost of operating is said to approximate two cents a day. Both a-c and d-c models are available. It requires no extra equipment—just a place to hang, an electric outlet to plug into, and it's ready for work in a jiffy. Altho the Midget King is capable of doing a tremendous lifting job, it is not a heavy, bulky tool. It can be carried to any place in the plant with very little effort. Yet despite its lightness, the Midget King Electric Hoist is tough; it's durable and sturdy in every mechanical feature.

Feeder Voltage Regulators

Especially designed for feeder circuits and industrial plants, air-cooled induction feeder voltage regulators of from 12 to 24 kva are described in a new 11-page bulletin.

Castolin Eutectic
LOW TEMPERATURE WELDING

IMPROVED METHOD FOR WELDING CAST IRON
Send for 36 Page Book

WAR plants the country over rely on Castolin Eutectic Alloy #14* (for gas welding) and Castolin Eutectic Alloy #24B* (AC-DC metallic arc) for easy, reliable welding and reclaiming of broken, cracked, worn or defective castings. These new low temperature welding alloys give a completely machinable, color matching weld—free from stresses and distortion.

Use Castolin Eutectic Low Temperature welding alloys #14 and #24B* in place of "hard-to-get" bronze welding rods. Castolin Eutectic Alloys #14* and #24B* contain no scarce metals . . . available with priority A9.*

Some territories available for Mfrs. Reps.
* patented

EUTECTIC WELDING ALLOYS CO.
40 Worth Street, New York, N. Y.

Among the features discussed in detail are electro-dynamic breaking phase angle adjustment and a new regulating relay. Operation and construction details are fully covered. Included in standard accessories furnished is a description of the operating mechanism, limit switch supply transformers and control facilities.

Control panel photographs identify and list principle parts; wiring diagrams show most common circuit connections.

A copy of descriptive data 47-175 may be obtained from department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

V-Belt Development

Concentrating longitudinal strength in a special central ply, straddling the pitch-line, while gripping is done by outside plies of firm, wear-resisting but pliable leather, is a V-belt development, detailed in new literature by Victor R. Clark Belting Co., 605 Washington Blvd., Chicago. The arrangement, with the center ply of tough, high-tensile-strength, stretch-resisting leather, is said by the firm to offer distinctive advances in v-belt efficiency and economy. The literature also details the firm's Ball-Bearing Fastener for V-belts, said to give snug fit without need of special tools.

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Today, you'll enjoy your stay at Hotel Lafayette more than ever! Extensively remodeled, and redecorated, this fine hotel offers new convenience and comfort —but the friendly hospitality is the same as ever. Excellent food, home-like rooms, reasonable prices. And remember: Hotel Lafayette is Buffalo's most centrally located hotel. Moderate rates: Single, $2.75 up; Double, $4.50 up; special rates for 4 or more.

Write for Folder J.

HOTEL LAFAYETTE

K. A. KELLY, Manager BUFFALO, N. Y.

The P-M Splicer

A new, improved universal quick-adjusting cable splicing holder that handles cable sizes from 1/16 to 7/32" without the use of adaptors is announced by Patrick-McDermott & Co., 2704 So. Hill St., Los Angeles, Cal.

The thimble or bushing and cable are held in a firm position by using only 2 adjusting screws. A thimble holder adjusting screw gives direct contact to the self-seating thimble socket. Turning thumb screw instantly places splicing holder in a rotating or a rigid position.

The splicing holder is made to assist the splicing operator in doing more effective and faster work.

A New Star Hacksaw Frame

A cam-action lever-lock sets up and releases the blade in a new type of hack saw frame manufactured by Clemson Bros., Inc., Middletown, N. Y., makers of Star Hack Saw Blades. It is claimed that loose blade studs and

threaded tension devices have been completely eliminated with the result that blades can be replaced or repositioned in a fraction of the time required with frames of conventional design.

Straighter cuts and a reduced blade breakage are also said to result from the extremely high tension which this new Star Frame puts on the blade. This high tension is possible because the frame is made of heat-treated spring steel.

Handle may be either straight (Star No. 30) or pistol grip (Star No. 20 as shown). It is patented design, molded of rust-free, heat-resistant Tenite—a non-conductor of electricity.

Frame may be adjusted for 8", 10" or 12" blades by pulling out a single pivot pin to its open position, sliding frame forearm in or out to desired length, and snapping pin back into blade. Blade may be re-positioned to face in any of four directions by placing it over either of 2 sets of fixed pins which are integral with frame.

Frame cannot jackknife or come apart accidentally with blade removed and there are no loose parts to fall off.

Rimlock Diamond Cut-Off Blade

Felker Mfg. Co., Torrance, Cal., announces a new diamond abrasive cut-off blade—the Di-Met Rimlock. This new blade is said to be particularly efficient in cutting all hard, brittle non-metallic materials, such as quartz, glass, porcelain, tile, ceramics, clay products, etc. The Rimlock differs from former diamond abrasive blades in the special bonding process which rigidly locks the diamonds in the rim of the wheel without crushing and with the benefits of longer life and considerably faster cutting ability. It is available in 2 types:—a hard steel bond that makes an exceptionally stiff and fast cutting blade, and in a copper bond which, tho not quite so fast or so stiff as the steel, operates with a softer action and with some increase in life

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THIS improved type band grinder speeds production in war plants throughout the country. Built to machine tool specifications, the Simplex-M eliminates expensive, slow, hand emerying and filing. It assures a perfect straight grain, sharp-edged finish on metals, plastics, wood and fibre. Whether your plant is large or small . . . investigate the economies of Simplex-M, today! Various styles and sizes.

Informative Booklet on Finishing
★
Write Today
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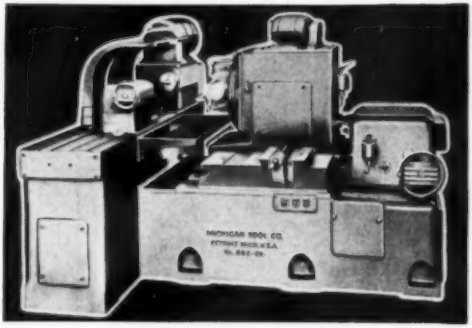
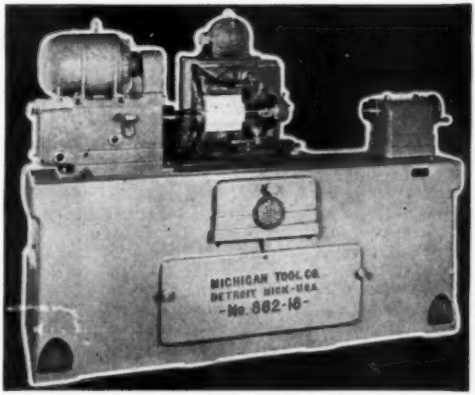
WALLS SALES CORP.
96 Warren St., New York, N. Y.

Michigan Series 862 Gear Finishers

A new series of heavy duty crossed-axis gear finishing machines for gears up to 24" in diameter, designated as the 862 series, is offered by Michigan Tool Co., 7171 E. McNichols Rd., Detroit. The new 862 series is suitable for finishing gears used in speed reducers, machinery of various types, large engines, turbines, etc., and is available in 2 sizes.



Flexibility of the machines permits application of the crossed-axis principle of gear finishing to a wide range of gear sizes. Gears as small as 2-¼" in diameter may be finished with the 862 machines. Face widths up to 20" may be accommodated. Gears may also be finished when mounted on long or large diameter shafts, thus avoiding errors due to mounting.



Flexibility of the machines also permits selection of the most desirable method of finishing for any specific gear type, taking into consideration face width, diameter and shaft length.

In all methods, the work drives the meshing cutter. In the first method, particularly suited to finishing wide face gears, the cutter, in addition to having an infeed toward gear, is reciprocated, also, parallel to axis of the gear.

This is accomplished by placing slide which carries cutter head in a horizontal position. Cutter itself is mounted on an anti-friction bearing spindle, with its axis at an angle to that of gear, viewed from front of machine. A vernier adjustment is provided for setting angle of cutter head.

When the machine is started, cutter head reciprocates laterally, sweeping cutter back and forth across face of gear as the 2 rotate in mesh. At end of each stroke, cutter carrying head is also fed slightly toward gear. When desired gear size has been reached, infeed stops and the cutter reciprocates a few more times without infeed to provide desired finish on gear teeth.

In the second method, used for quick finishing of gears having a narrower

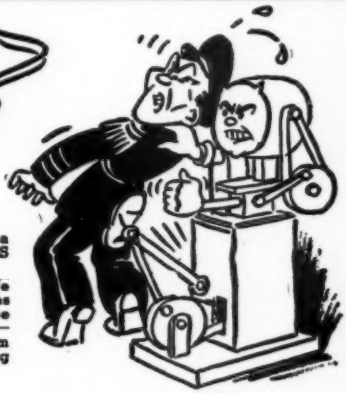
face width than cutter, and also for close shoulder work, the slide is set vertical, the cutter however being in the same crossed-axis relationship to gear as in the first method. Infeed is not used, but the cutter head is located in such a manner that the axis of the cutter and the axis of the gear, when viewed vertically, are at proper center distance from each other for correct sizing of gears. Gear is placed on machine in light mesh with cutter and machine is started. Cutter head then moves down until cutter has passed maximum depth of cut and then returns to its starting position, completing machine cycle.

In this method, cutting action is due to the crossed-axis relationship existing between gear and cutter, each serration in cutter sweeping across face of teeth being cut while gear and cutter rotate in engagement. Speed of the single reciprocation of cutter head on cutter slide is, of course, set much slower than for the multiple reciprocation employed in the first method.

The third method represents a combination of the first and second methods. Cutter slide is again vertical, but infeed is used, the cutter head reciprocating vertically instead of horizontally as in the first method, the gear being finished by a number of vertical "passes" instead of the one as in the second method. Any amount of infeed may be used. The infeed is automatically terminated by means of a limit switch.

Provision is made to permit crowning of gears when desired. Crowning is used sometimes to avoid unduly high localized tooth loading at outer ends of gear teeth due to possible final assembly inaccuracies in alignment. It thus helps to assure more even tooth loading and reduced wear in many instances.

Control for both machines thruout their operating cycles is entirely electrical. Operation is thus materially simplified and flexibility and precision of control are increased. Down time for resetting is also reduced. Move-



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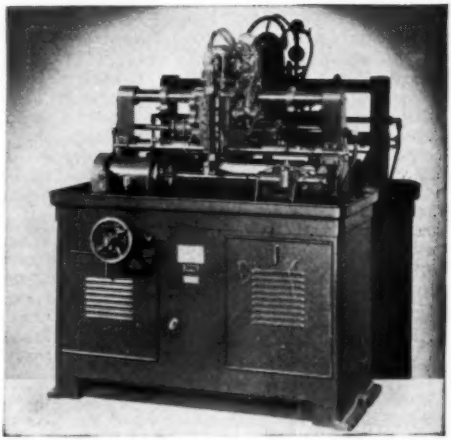
Machine Tools

400 SOUTH CLINTON ST., CHICAGO, ILL.

Superfinishing Cylindrical Work

Recent improvements have been made on the Foster 4 x 18" General Purpose Superfinishing Machine, and a new and longer 4 x 36" Model has been added to the line offered by The Foster Division of The International Machine Tool Corp., Elkhart, Ind.



The makers say these general purpose units are capable of developing an extremly accurate and fine finish of 2-5 micro-inches on cylindrical work such as shafts used in aircraft engines, etc., where surface scratches and defects must be eliminated.

It is explained that in small production shops and tool rooms without grinder equipment capable of producing a fine finish on parts, these superfinish machines, by use of both coarse and fine abrasive stones, will produce superfinished surfaces from those that have only been turned, and at the same time produce the desired dimensions of the finished pieces. In addition, these machines can be used to eliminate defects not usually visible to the eye, but injurious to bearings such as grinder feed spirals, chatter marks, grinder flats and other defects caused by machine tool inaccuracies.

Spindle nose is provided with a No. 5 Morse Taper, and work holding centers having a No. 3 Morse Taper are mounted in a sleeve or adapter. Spindle nose is also accurately machined, and arranged with large heavy threads permitting the use of a face plate, 3 or 4 jawed chuck, or special work-holding fixtures.

An enclosed ball-bearing motor drives variable speed transmission, which provides an unlimited number of spindle speeds ranging from 25 to 690 r p m. This is accomplished thru application of a variable speed pulley drive system, manually controlled by the large hand wheel located on left front face of machine. Actual spindle speeds are shown by speed indicator dial and mechanism located near hub hand wheel.

Oscillating Head Carriage is longitudinally traversed by a double-end hydraulic cylinder bolted to back side of head carriage. A fixed piston rod, arranged with a single piston, causes travel of cylinder and head in either direction.

Traverse rate may be varied from 0" to 30" per minute thru an aperture control valve. Reverse of head traverse is accomplished automatically thru use of a directional control valve, tripped by 2 adjustable dogs. Length of travel is controlled by setting the 2 dogs on the square rod, which in turn operates directional valve. Two positive stops, located on upper guide bar are provided for fixing location of head when traverse is not employed.

The oscillating head, which is mounted on two rigid guide bars, is arranged with an off-center drive, which provides an oscillating longitudinal traverse of approximately 3/16". The stone-holding unit is mounted in "V"-type ways, and may be moved towards or away from work by oil-operated piston controlled by a directional valve.

In addition, stone-holding unit is arranged with a spring pressure mechanism, proper tension of which is maintained by oil pressure in the hydraulic cylinder.

Pressure on the stone may be varied in accordance with requirements of the job by an oil pressure regulator. A gage is provided by which operator may check pressure on stone at all times.

The oscillating superfinishing head drive is arranged with V-belt drive complete with a self-adjusting sheave wheel, which permits an unlimited number of speed changes ranging from 306 to 638 rpm., and correspondingly unlimited variation to rate of oscillation of superfinishing head.

The cutting fluid system consists of a motor-driven coolant pump, complete with a reservoir and filtering mechanism, in base. Cutting fluid is supplied to cutting surface of the stone, and its volume may be controlled by a small valve located in supply line at right-hand side of oscillating head. Coolant then drains back into reservoir, at which time it is filtered. When filter becomes loaded, it may be changed.

Parts without centers can be accommodated by use of a centerless roll drive. Fibre rolls, upon which work is driven, are rotated by a pinion mounted in spindle nose, for a chain and sprocket drive. No sacrifice in machine capacity is made with use of the centerless roll drive.

Three or 4 jaw, or collet type chucks may be used on these general purpose superfinishing machines.

Foster also has superfinishing machine capacities available for sub-contracting work. Manufacturers are invited to make inquiry in regard to possibilities and results of superfinish on their work and receive recommendations and prices from Foster Engineers. Any general type of cylindrical superfinishing work is desired up to 10" dia. x 4' long, centerless work up to 2 to 2½" dia. x 4" to 5" long; and some types of flat finish work can be readily handled.

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Write for Circular

NIELSEN TOOL & DIE COMPANY
1859 Gardner Ave.
Berkley, Mich.

Ingersoll-Rand Lightweight Drill

A new lightweight pneumatic drill is offered by Ingersoll-Rand Co., 11 Broadway, New York City.

Identified as the Size 00A Drill, it weighs less than 2 pounds. Powered by an efficient "Multi-Vane" air motor, it is sturdily constructed for 3-shift endurance. A built-in speed regulator can be set for desired performance, and split-second throttle action permits quick, accurate hole-starting. Lubrication is provided by a built-in automatc oiler.

Because of its light weight and "fit-the-hand" pistol grip, the drill is especially adapted for women operators. A chuck shield offers protection, and also enables operator to guide the drill more effectively.

Sustaining Employee Morale

An attractive new sign, illustrated here in miniature, is being distributed to war producton plants by the War Production Institute with headquarters at 1991 E. 66th St., Cleveland, Ohio.

The sign is available to plants which

are devoting 50% or more of their production to the war effort. It is printed on a good grade of banner sign cloth in patriotic red, white and blue. Dimensions are 48x72". Under normal conditions it should last a year or more.

In a number of test cases, the sign has been found to stimulate war production effort and to reduce or eliminate slow-down tendencies among plant personnel.

Book On Inspection Methods

"Industrial Inspection Methods", Michelon; 389 Pgs., with index. 8x11"; published by Harper & Bros., New York, $3.50 post paid.

In this work, the author, Leno C. Michelon, War Training Div., Illinois Institute of Technology, gives organized, progressive treatment of a subject which should meeet with immediate response on the part of industry, faced with the responsibilities of making the most complicated apparatus it has ever built. With introduction and foreword by Prof. J. I. Yellot, Chairman, War Training Committee, I.I.T., and Lt. R. J. Dombrow, Chief, Inspection Div., Chicago Ordnance Dist., importance, timeliness and authoritativeness of the work and its significance to inspection training programs, everywhere, is effectively brought home.

Chapters are devoted successively to a definition of inspection; non-precision inspection and precision inspection, with instruction in proper application of instruments, methods and essential mathematical and scientific procedures. Included are chapters on sampling, ray-inspection, magnaflux - inspection, etc. Given, also, are important mathematical tables.

For the firm with an inspection-training program, the volume will be valuable as a basis of curriculum, or as reference.

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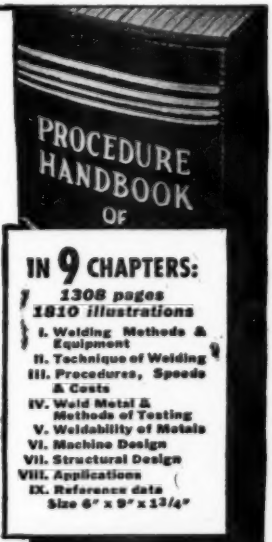

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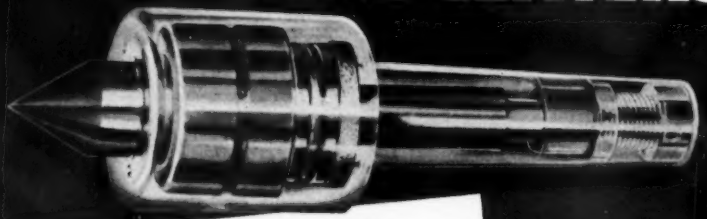

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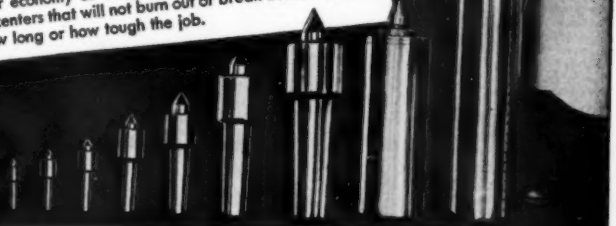

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Left—100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	¼x¼x2
R-101	L-102	5/16x5/16x2¼
R-103	L-104	⅜x⅜x2½
R-105	L-106	7/16x7/16x3
R-107	L-108	½x½x3½

Right—200 Series

Tool No.	Shank Size
200	¼x¼x2
201	5/16x5/16x2¼
202	⅜x⅜x2½
203	7/16x7/16x3
204	½x½x3½

Below—300 Series

Tool No.	Shank Size
300	¼x¼x2
301	5/16x5/16x2½
302	⅜x⅜x2½
303	½x½x3½

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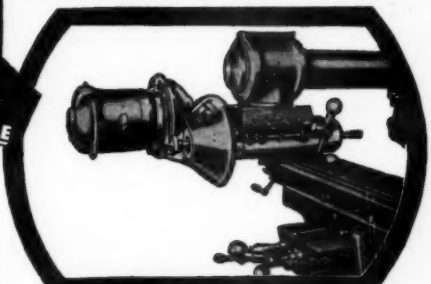

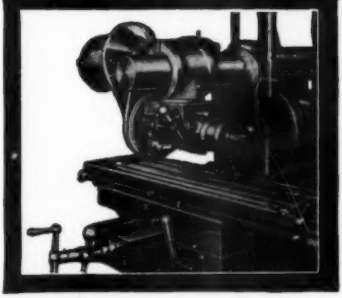

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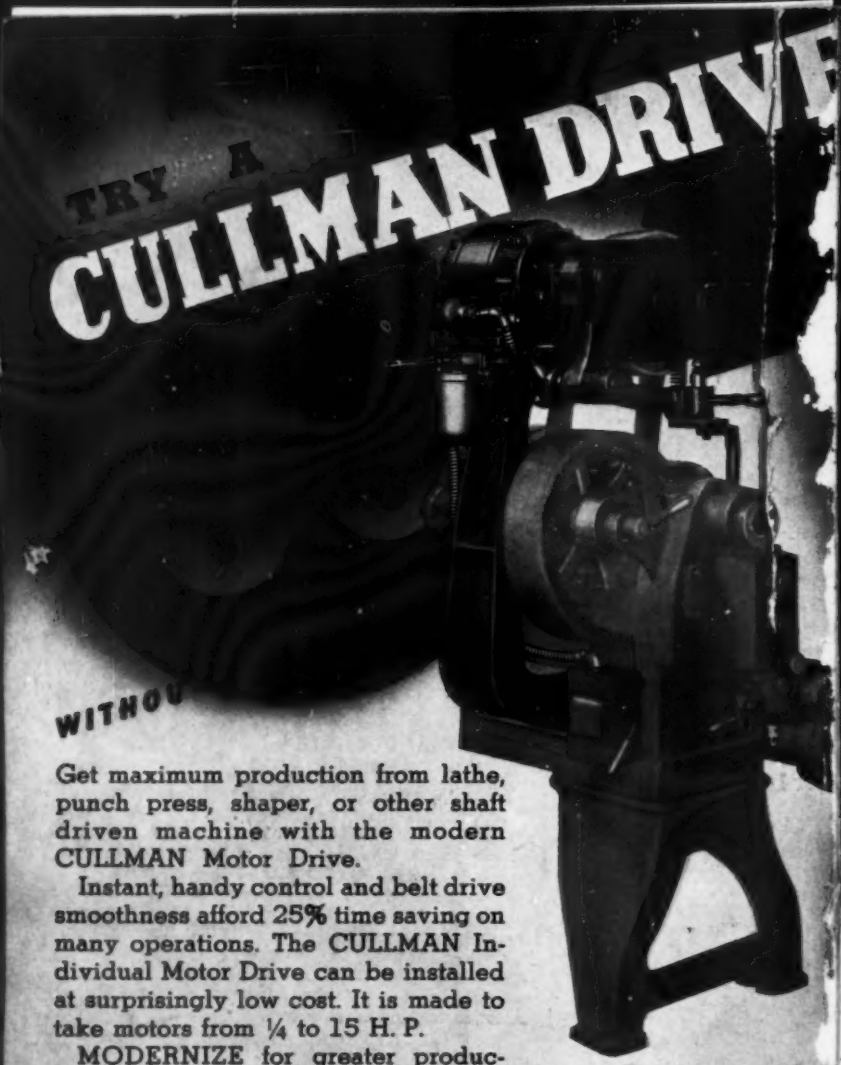

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